National e-Conference on Artificial Intelligence and Machine Learning (eC-AI & ML) 2021

Research opportunities and Applications in the fields of Engineering and Sciences

November 26th & 27th 2021
Friday & Saturday

Organizedby

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Department of Information Technology

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PREFACE

"E-Conference on Artificial Intelligence and Machine Learning (EC-AI&ML 2021)" is organized with an objective of strengthening the research culture by bringing together academicians, researchers, scientists, professionals and students to share their knowledge and expertise in the field of Intelligent Computing, Communication and Convergence and address various issues to increase awareness of technological innovations and to identify challenges and opportunities for the development in the domain of Artificial Intelligent and Machine Learning. The event was conducted online on 26th to 27th November 2021.

AI& ML is a one of the thrust & emerging areas identified by AICTE. The E-conference will provide platform to the authors and attendees for collaborations and networking among Universities and Institutions from India and abroad for promoting research and trending technologies.

The E-conference covers research in the areas of Artificial Intelligence, Machine Learning, and Deep Learning applications in health care, agriculture, business and security. It also includes research in core concepts of Computer Networks, Intelligent System design and deployment, real-time systems. The theme is on a broader front and focuses on various innovation paradigms in Artificial Intelligence and machine Learning, intelligence and sustainability that may be applied to provide realistic solution to varied problems in society, environment and industries.

The aim of this conference is to promote basic and advanced research into applied investigation and convert applied investigation into practice. This conference will also create awareness about the importance of basic research in the fields of Artificial Intelligence and Machine Learning. It's also highlight the impacts of intelligent systems in a changing world and solving complex problems. Conference provides you multiple opportunities to have in-depth discussions on topics of your interest.

TCET has strong belief in quality and relation building. A lot of care is taken for branding the event. Total 35 papers were received and 32 papers were presented in two days. Around 408 participants and delegates from India and abroad including Industry personnel have attended the two days program.

We appreciate the efforts of all the members of the organizing and editorial committee for supporting the event and extending their cooperation to make it a grand & successful event.

Team- EC-AI & ML-2021
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CONTENTS

Smart Energy Management System using Non-Intrusive Load Monitoring

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Abstract – **Energy Management is a problem faced by many around the world. The ever-rising demand for energy is putting a strain on the world- wide resources. Additionally, during the pandemic it was observed that there was a lot of discrepancy in the electricity bills. To do our part in addressing the issue, the combination of Internet of Things (IoT) and Machine Learning (ML) has been used in creating a solution which will help measure, monitor and visualize daily energy consumption of a household. Additionally, using the concept of Non-Intrusive Load Mon- itoring (NILM) a single hardware setup can be used to measure the energy consumption of each appliance in the household. This hard- ware setup with the use of certain ML algorithms like Factorial Hidden Markov Model (FHMM) and Combinatorial Optimisation (CO) dis- aggregates the combined household energy readings to device specific values. These values then get sent to a cloud database and are pre- sented to the user through a Dashboard like visual interface. Therefore the system in whole offers a combined solution to the user with minimal Smart setup and cost to give a generic idea based on the energy usage, pat- tern, consumption. Such monitoring and systems can help efficient and responsible energy usage and can go a long way in ensuring sustainability.**

Keywords: Internet of Things, Machine Learning, Energy Management, Non-intrusive Load Monitoring

I. INTRODUCTION

Dependence of humans on electricity is ever-increasing especially in this tech- nology driven world, where even the smallest of appliances needs electricity for its functioning. In such a situation the resources are strained, there is an increase in carbon footprint and the goal of sustainability seems further far- fetched. Especially in the residential sector a lot of energy wastage takes place and often goes unnoticed. If the end user is informed about the consumption, it can help and reduce wastage. Thus, the concept of informed consumption is vital. Following on this idea a residence-specific, cost-effective energy manage- ment solution was developed. It includes the concept of Non-Intrusive Load Monitoring (NILM). NILM is based on the principle of energy disaggregation. A combined reading is disaggregated into device specific values. This is useful as it requires just a single hardware setup thereby making it cost effective and less intrusive. The readings are sent to the cloud database and a user interface has been provided through which consumers will be able to view the energy expenditures for each registered appliance, monthly, yearly, values and the esti- mated energy bill. This feature will allow users to check for discrepancy in the received electricity bills by the electricity board at the end of every month; a problem encountered by many in India especially during the early pandemic days. Many citizens felt that the bills they have received are wrong and the bill calculations are not correct [1] [2]. The proposed system is hence, labelled as 'Smart' Energy Management System as it combines the functionality of disag- gregation and visualization utilizing the included algorithms and setup. Thus four goals of Measurement, Management, Monitoring and Visualization have been combined in a single application.

II. RELATED WORK

Several studies have shown the design of a home energy management system before. Various technologies have been used by researchers to achieve this goal. In [3], ZigBee technology has been used, where ZigBee based modules are deployed to monitor appliance consumption in addition to a Power Line Communication (PLC) based gateway. [4] used a complete IoT based approach to monitor energy consumption using Wi-Fi and MQTT protocol. [5] also uses IoT approach in addition to Blockchain for controlling and synchronization of various IoT devices and deploys a microcontroller based circuit in the hardware module. In [6], an Arduino Uno and ESP8266 module is installed near the MCB and an interconnection of Relays was used to switch ON/OFF the appliances. Most of the above works use multiple hardware modules and interconnections to achieve appliance specific energy monitoring. The problem with multiple device approach is that in place of a single hardware module used in the NILM approach many such modules will be required. This will naturally increase the cost of such system and will be tedious on the installation front. Moreover, in place of maintaining a single module in the NILM approach maintenance of several modules are required in the intrusive approach. In [7] NILM based approach is used. The algorithms used in this approach are Decision Tree and K-Nearest Neighbour(KNN). These are essentially and widely used as supervised classification algorithms. The classification algorithms only classify a state for a given device (say ON/OFF) when a combined power rating is given. Thus, this approach is used for load identification. However, it is also required to give the actual consumption value for a given device and not just its ON/OFF status which can be procured by algorithms like FHMM and CO and are thus used in this proposed system. With the help of these algorithms this system gives the values of individual power consumption of each device as well. Through this proposed system it has been attempted to offer a solution to monitor device specific energy consumption through a single hardware module in

a non-intrusive method and also indicate the power consumption of each of the monitored devices as well. To achieve this usage of NILM techniques and algorithms is done along with a single hardware module for data acquisition and web based Dashboard as a visual interface.

III.   NON-INTRUSIVE LOAD MONITORING OVERVIEW

Non-Intrusive Load Monitoring (NILM) is a form of Appliance Load Monitor- ing (ALM) techniques. It is also called single point monitoring as it measures consumption from just one point (like an energy metre). This has many practi- cal advantages like low hardware cost, low installation costs, easy installation, etc. This NILM concept is not new. It was proposed by George W. Hart, Ed Kern and Fred Schweppe in the 1980s which can be further reviewed in [8]. However, especially in India it is still not much in practical usage and attempts are being made to further enhance it. The first step to NILM is Data Acqui- sition. Using suitable hardware set up data is acquired. This data consists of combined readings for an entire household or a specific measurement area. The concept of NILM can be mathematically defined as,

$$P(t) = P1(t) + P2(t) + P3(t) + ...Pn(t) \qquad (1)$$

where P (t) is the combined power rating at the point of measurement whereas P1(t), P2(t), etc are ratings of individual appliances contributing to

the combined power and n is the number of appliances. NILM disaggregates

P (t) into individual appliance power. The first step to this disaggregation is data acquisition. The aggregated energy rating is captured using a suitable hardware at a specified sampling rate. Then the acquired data is processed using various algorithms. Then the appropriate load and its consumption is identified. The algorithms used for NILM are supervised or unsupervised. As per the supervised algorithms, the system has to be trained using an adequate amount of labelled data. Various datasets have been developed for NILM pur- poses however most of them, like Reference Energy Disaggregation Dataset (REDD) [9],Building-Level fUlly-labeled dataset for Electricity Disaggrega- tion (BLUED) [10], etc. have been developed for foreign households and their typical appliances. Indian data for Ambient Water and Electricity Sensing (iAWE) consists of both aggregate and sub-metered readings. More informa- tion of iAWE is available in [11]. However, to be able to appropriately test the dataset we have developed all our own datasets which have been elabo- rated in the further sections. A supervised algorithm Factorial Hidden Markov Model (FHMM) and Combinatorial Optimisation (CO) have been used in the implementation of the proposed energy management module. FHMM is an improvisation of the Hidden Markov Model (HMM) which in turn is based on the Markov chains. Formally, we can represent a FHMM as a set of k HMMs that evolve simultaneously and independently over time. In the implementation of FHMM in the energy disaggregation it initially assigns

an HMM to every device whose energy has to be disaggregated. Then it combines all HMMs into a single one. This is the training phase. In the testing phase, it runs the Viterbi algorithm to find the most likely sequence of states given the observations. Combinatorial Optimisation (CO) on the other hand, is a relatively simpler algorithm as compared to FHMM. During training the power consumption of each device is clustered into values based on its different states. For example, if an appliance has consumption values as {20, 23, 18, 0, 0, 0, 2, 19} then they will be clustered as {20, 0} corresponding to two power states. Then a two dimensional array will be made in which each column will represent a device and the rows represent all the possible device combinations. During disaggre- gation the algorithm just finds the row whose sum is nearest to the aggregated signal. [12] gives in depth information about these algorithms in addition to additional algorithms of NILM.

IV.   SYSTEM DESIGN

This section discusses the design of the proposed system for energy disaggre- gation. The system can be divided into two parts- the Hardware module for data acquisition and disaggregation whereas the Software module consists of the ML model, cloud database and the dashboard based web application to view the disaggregated data. Fig. 1 gives an overview of the system as a whole.

4.1 Hardware Design:

The hardware module consists of a sensor for measuring the energy ratings and a microcontroller for measuring and processing of the data. Various sen- sors exist which measure AC values like ACS712, SCT-013, PZEM-004T. The

Fig. 1   Block Diagram of the proposed Energy Management System using NILM

former two sensors had certain limitations: only current or voltage values were obtained, signal conditioning circuits were required, etc. However PZEM-004T requires no additional circuitry to support its functioning, it has libraries aiding its operation in Arduino and Raspberry-Pi interfacing. Moreover, it provides six readings: voltage, current, frequency, power factor, power, energy. Hence, PZEM-004T energy measurement module was selected as a sensor. It uses a non-invasive Current Transformer(CT) sensor. The CT sensor has a primary winding a magnetic core and a secondary winding. The live or neutral wire acts as the primary winding. The data is read through the TTL interface. The

measuring range of the module is upto 10 A as it is and up to 100 A with the additional current transformer module. The 100 A setup has been used in this system. The microcontroller used is Raspberry Pi 3B+ due to its com- patibility with Python programming language (since most of the coding and algorithms have been developed in Python), internet connectivity and an abil- ity to support a machine learning module in itself. Fig. 2 indicates the overall hardware module circuitry. As is previously mentioned, due to presence of a single module for hardware the cost for multiple sensors and modules with their installations is reduced to a great extent. The module primarily needs a microcontroller and a sensor for its implementation which brings down its cost and makes the system cost-effective as opposed to its intrusive variant which needs multiple such modules to be installed for each appliances required to be monitored.

4.2 Software Design:

From the software perspective the entire operation can be divided into three steps. The first step is disaggregating the acquired power readings. There are certain algorithms like Decision Tree or KNN which tell us the ON/OFF sta- tus of the appliance. However FHMM and CO tell us this status as well as give
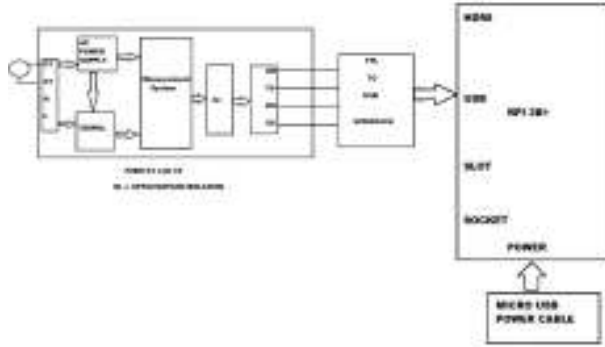

Fig. 2   Raspberry Pi with PZEM-004T interfacing

the value for power consumption of each appliance. Moreover, these algorithms have been included in the NILM Toolkit [11] which is used to standardize the various algorithms and datasets to aid researchers. Thus, the FHMM and CO were selected in this approach. The disaggregated values from both these algorithms are compared in further sections. The Simple Load Disaggrega- tion (SLD), a python based library has been used for the implementation. A detailed overview of SLD can be found in [13]. The trained machine learn- ing model is loaded into the Raspberry Pi 3B+. The readings are collected through the sensor and sent to the microcontroller via TTL interface. The microcontroller reads these values and processes them through the algorithms. The disaggregated values are acquired and are sent to the cloud database. For the purpose of this implementation MongoDb Atlas Cloud Database service is used. It is a NoSQL form of cloud database and thus offers flexibility. It is a document database, which means it can store data in JSON or BSON like documents. It also supports array and nested object values and allows for flexible and dynamic schemas. The values are stored with specific timestamps

to extract and display data at weekly, monthly, yearly time frequencies. The values from the hardware module are sent to the cloud database. The last block of the energy suite is the creation of a visualization interface for the user. This is in the form of a dashboard like structure where the user will be able to monitor the readings. The visualization gives users control over their energy expenditure. If any discrepancy is observed, it can be acted upon easily. Various plots are being plotted containing different parameters such as total energy consumption, total power consumption, appliance wise consumption in percentage, monthly consumption, power factor, frequency, units of electricity consumed, etc. The figures Fig. 3, Fig. 4 shows the created visual interface Hence using the hardware module the electricity readings can be mea- sured and the algorithms will disaggregate them into individual device-specific readings. Through the dashboard users can keep an eye on their personal con- sumption. Thus, with this setup using a single hardware module user will be able to easily monitor and measure the personal energy expenditure. The visu- alization interface presents the users a view of their consumption habits and

Fig. 3   Dashboard Line Charts

Fig. 4   Dashboard Gauge Charts

it has been seen that such view can inculcate an energy saving behaviour in users. Thus this view can be called as a feedback to the consumers which in turn helps in inducing a behaviour towards efficient energy consumption. Hence this system can be said to provide this feedback mechanism.

V.   DATASETS:

For this implementation specific datasets were created. These datasets pertain- ing to the implementation facilitated appropriate testing of the entire setup.

Although there are a few pre-existing datasets for NILM and energy disaggre- gation purposes, the electrical appliances used in those datasets are varied and large in

number. Even though it was possible to train our models using them, it was not easily possible to test those models accurately due to unavailability of so many appliances and the setup. Four datasets were created and trained using two algorithms- Factorial Hidden Markov Model and Combinatorial Optimisation. Both the algorithms follow distinct methods for disaggregation as discussed in the earlier section. For the preparation of the datasets, a sub- metering approach was used where a separate sensor was attached to each device to get its individual values whereas another sensor was connected to the main meter providing a supply to both the devices. The description of each dataset is as follows:

- Dataset 1: In the first dataset a 9 W LED Bulb along with the hairdryer was used. Since the consumption of hair-dryer was very high as compared to the LED bulb the algorithm gave poor results. The algorithm rejects the LED bulb values and hence the accuracy is impaired. It was thus inferred that, the appliance in consideration for disaggregation should have compa- rable values. (If there are appliances with comparatively lower consumption values, readings of such can be combined into one during practical imple- mentation. For eg: If the reading of a single light bulb is low for the purpose of disaggregation the entire lighting system of a household or of two to three rooms can be combined.)

- Dataset 2: This dataset was made between a 100 W incandescent light

- bulb and hair dryer operated in a single mode. Due to the single mode of appliances the power consumption of each appliance was almost constant and the values of it were comparable unlike in that of dataset 1. This resulted in great accuracy for disaggregation.

- Dataset 3: This dataset was made for a 100 W incandescent bulb but this

- time the hair dryer was operated in both its modes (HIGH and LOW) to test for hidden mode identification by the algorithm. Although the accuracy degraded than dataset 2 giving out some false negatives as well but all in all it was still better than dataset 1.

- Dataset 4: This dataset was made between a 9 W LED bulb and a 5 W LED

- bulb. There were no false positives or false negatives but the accuracy was not as good as the dataset 2. Overall the algorithm becomes less accurate if power consumption values are very less.

The combined readings as well as the individual appliance readings taken for each dataset are graphically represented in the figures 5, 6, 7, 8 respectively.

The advantage of these datasets are that they are practically evaluated. These datasets incorporate not just different types of appliances but also their combinations in various modes. These can be further leveraged by researchers for research and development regarding the same topic of energy disaggre- gation. Moeover, the performance of these datasets was evaluated based
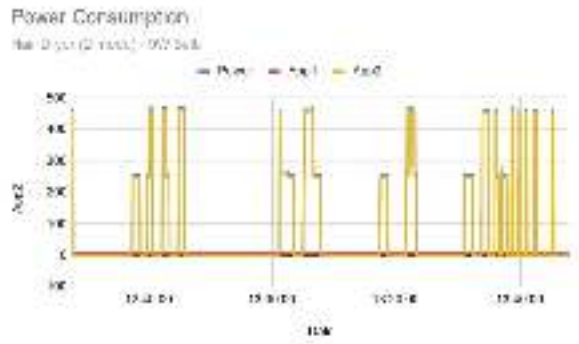
Fig. 5 The graph for Dataset 1. The blue line indicates the total power whereas the yellow line gives the hair- dryer values. The red line at the bottom indicated LED bulb values which evidently is very low compared to total rating.
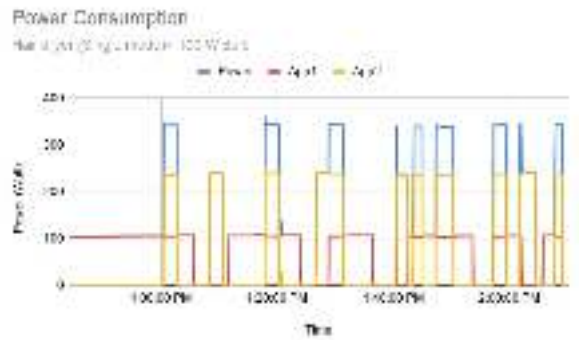
Fig. 6 Dataset 2- Hair Dryer in Single Mode. The blue graph gives the total power, yellow the hair-dryer power and the red as the incandescent lamp power. on certain parameters like Normalized Error in Assigned Power (NEP) and

Fraction of total Energy Assigned correctly (FTE).

Normalised Error in assigned Power (NEP): The sum of the differ- ences between the assigned power and actual power of appliance n in each time slice t, normalised by the appliance's total energy consumption. It can take any non negative value but lower values are desirable.

$$\frac{\sum_t y_t^{(n)} - \hat{y}_t^{(n)}}{\sum_t y_t^{(n)}}$$

Fig. 7 Dataset 3- Hair Dryer in Multi Mode. The blue graph gives the total power, yellow the hair-dryer power and the red as the incandescent lamp power.
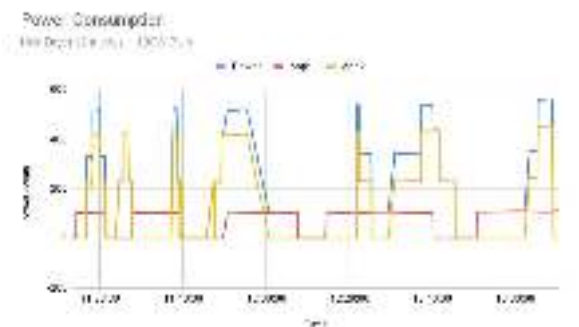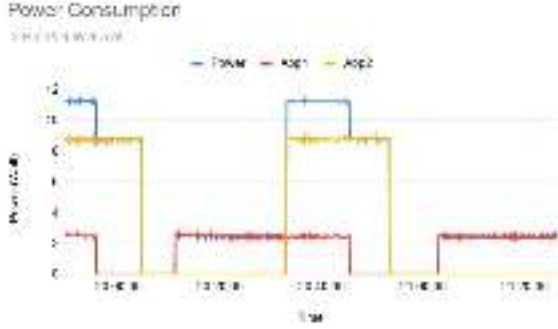
4

Fig. 8   Graph of Dataset 4. Blue line gives total power, the yellow gives the 9W bulb power and the red line gives the power for the lower rating bulb.

where, y(n)

is the actual   power and yˆ(n) is the predicted power for nth appliance at time t

- Fraction of total energy assigned correctly (FTE): The overlap between the fraction of energy assigned to each appliance and the actual fraction of energy consumed by each appliance over the data set. Value varies between 0 and 1. Higher value is desirable.

$$\sum_i \min \left(\frac{\sum_n y_i^{(n)}}{\sum_{n,t} y_i^{(n)}}, \frac{\sum_n \hat{y}_i^{(n)}}{\sum_{n,t} \hat{y}_i^{(n)}}, \right)$$

(3)

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where, y(n) is the actual   power and yˆ(n) is the predicted power for nth appliance at time t

VI.   IMPLEMENTATION AND RESULTS

The dataset was divided into training and testing and the predicted output was again verified with the actual values of power consumption. It was made to run for both the types of algorithms, FHMM and CO; the results of which have been compared further. The first dataset gave very poor disaggregation results and as per discussed earlier it was majorly because the power consumption of one appliance was negligible in comparison to the other. The second dataset in which the appliance 1 i.e. the hair dryer was operated in just a single mode whereas the incandescent lamp also had a constant 100 W consumption. This gave good results for both FHMM and CO. The following figures analyse these outputs where the graphs compare actual and predicted output of each device and the device-wise share of the total consumed power.

Fig. 9   Dataset 2: Appliance 1 prediction and   actual values
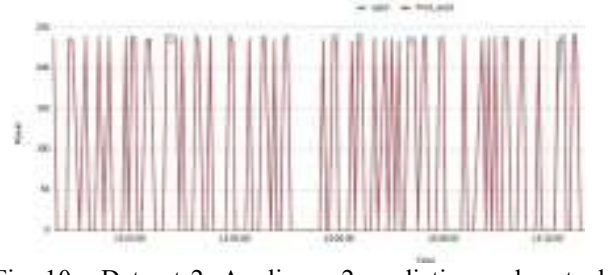
Fig. 10   Dataset 2: Appliance 2 prediction and   actual values

In Fig. 9 and Fig. 10, the blue line gives the actual power consumed whereas the red line indicates the predicted power output. A good overlap suggests good
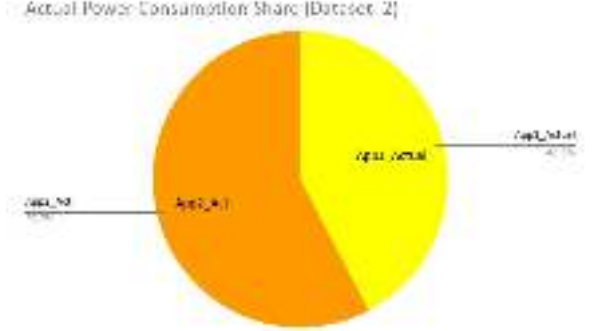
Fig. 11   Dataset 2: Actual Power Consumption Share
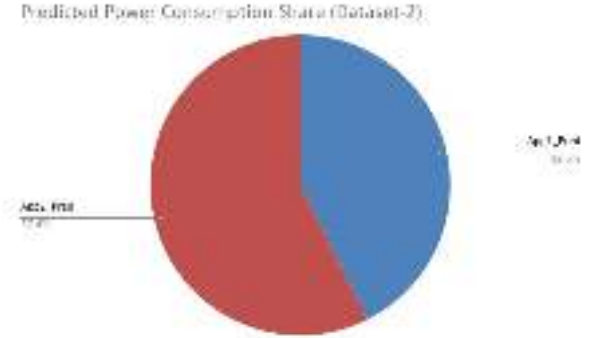
Fig. 12   Dataset 2: Predicted Power Consumption Share

prediction accuracy. The figures Fig. 11 and 12 show the consumption share. The actual values show 57.7% and 42.3% consumption share for hair-dryer and lamp respectively. Similar analysis has been obtained for each dataset depicted in the Fig. 13-16. Due to two modes the accuracy has reduced in dataset 3 than   earlier dataset but it is still good.

Here the first graph (Fig. 13) gives predictions for the incandescent lamp whereas the second one for hair-dryer (Fig. 14). Due to the multi-mode oper- ation of the hair-dryer in this case the accuracy has been reduced to some extent. The blue lines give actual   appliance consumption whereas the red lines give the   predicted values over the time of measurement. Similar to Dataset 2, a consumption share pie-diagram has been plotted as well. For this the actual percentage of share was 58.1% and 41.9% of total power for appliance- 1 and appliance-2 respectively whereas the algorithm predicted it as 60.4% and 39.6% of total   power for appliance-1 and 2 respectively (Fig. 15-16). The results of Dataset 4 (Fig. 17-20) were not as promising to the previous two datasets owing to its very small power

consumption values. The blue lines and
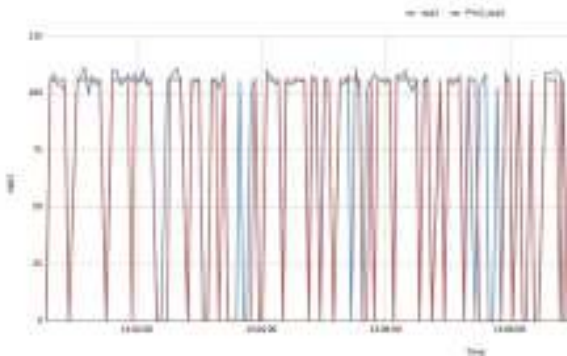
Fig. 13   Dataset 3: Appliance 1 prediction and actual values
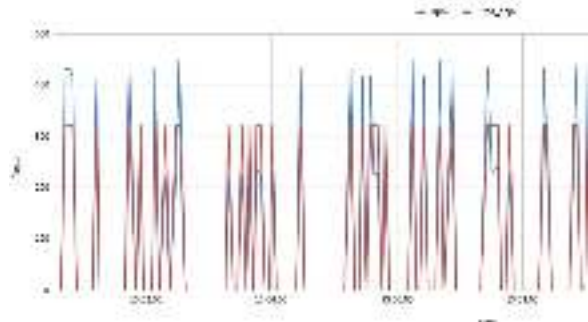
Fig. 14   Dataset 3: Appliance 2 prediction and actual values
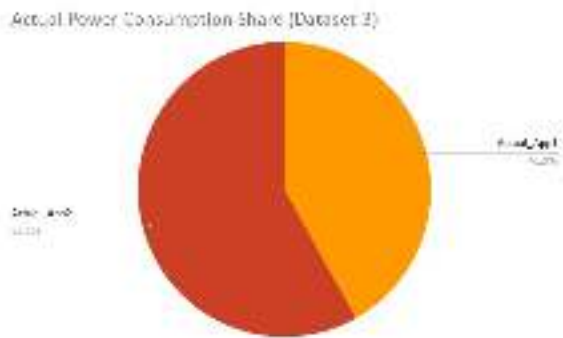
Fig. 15   Dataset 3: Actual Power Consumption Share

red lines depict actual and predicted power consumption respectively and the Fig. 17 and Fig. 18 gives the values for appliance-1 and appliance-2 which in this case were LED lamps of different wattage (9W and 5W). The difference in
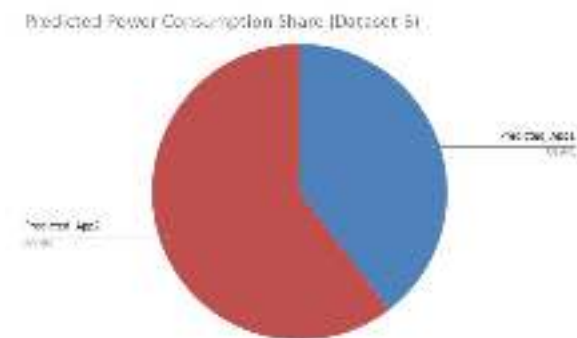
Fig. 16   Dataset 3: Predicted Power Consumption Share

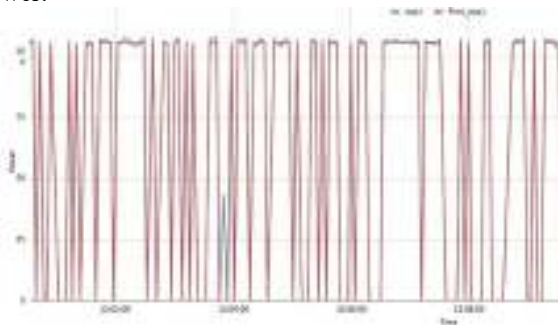Appliance 1 power consumption and its prediction is just 0.5 W but it appears amplified due to its small value.
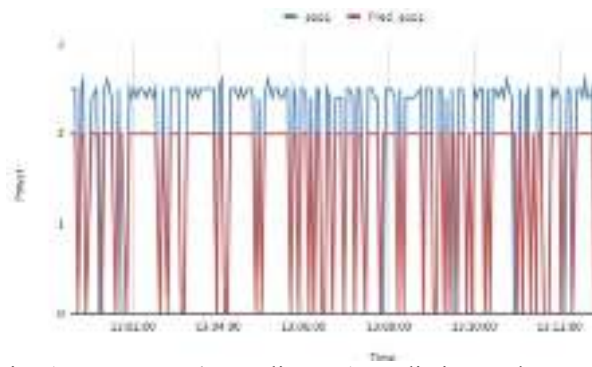
Fig. 17   Dataset 4: Appliance 1 prediction and actual values
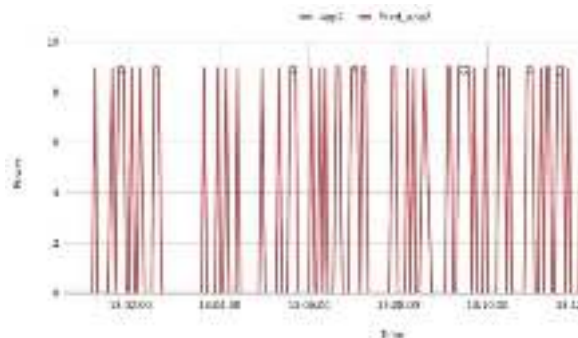
Fig. 18   Dataset 4: Appliance 2 prediction and actual values
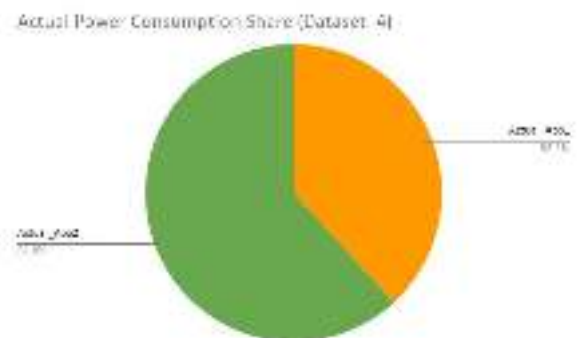
Fig. 19   Dataset 4: Actual Power Consumption Share
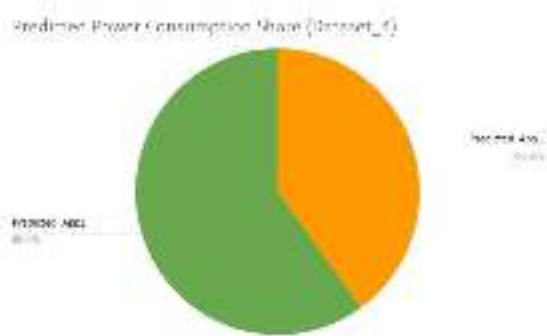
Fig. 20   Dataset 4: Predicted Power Consumption Share

For the power consumption share, the actual values were noted as 61.8% and 38.2% respectively for each appliance whereas the predictions mention it as 65.9% and 34.1% respectively.

The above results have been plotted for the FHMM algorithm. Similar analysis was done for the CO

6

algorithm as well. The actual and predicted values were observed and the accuracy and performance of each algorithm for each dataset was determined using the evaluative metrics like NEP and FTE defined in the earlier section. The table 1 gives values for the FHMM algorithm for all datasets (except dataset 1 as the accuracy obained was low), whereas the table 2 gives the same values for CO algorithm.

The value of NEP should be as low as possible whereas for FTE it should be as high as possible. Thus accordingly it can be observed that for dataset

2 exactly identical performance has been observed for both the algorithms, owing to the fact that this dataset consisted of both appliances working at high

Dataset Number	FTE (Same for both appliances)	Appliance	NEP
2	0.99411	1	0.00549
		2	0.0177
3	0.94586	1	0.01004
		2	0.0228
4	0.95628	1	0.14198
		2	0.0217

Table 1   Dataset Results for FHMM algorithm

Dataset Number	FTE (Same for both appliances)	Appliance	NEP
2	0.99411	1	0.00549
		2	0.0177
3	0.9469	1	0.11786
		2	0.0169
4	0.95626	1	0.16794
		2	0.0217

Table 2   Dataset Results for CO algorithm

and comparable powers and in the same mode, thereby making it easier for both algorithms to disaggregate them . The second algorithm with air dryer operated in two modes sees FHMM having superior performance for Appliance
1 i.e. the incandescent lamp whereas for hair dryer the CO performs in a better manner. CO offers better FTE in dataset two albeit with a small difference. In the fourth dataset the appliance power consumption values were small and as CO is very sensitive to small changes in values the performance of FHMM was overall better.

VII.   Conclusion

It has been observed that model gives best performance when used to disag- gregate appliances having comparable values of power consumption, i.e. not having a device with very negligible power consumption as compared to the total consumption. Since while practical implementation, a user will anyway have more concerns over his/her consumption of high powered appliances this will not act as a blocker during implementation. Moreover as the complex- ity increases, i.e. when the number of hidden modes or number of appliances increase algorithms shows slightly decreased accuracy. Through the help of such a system a general idea can be obtained for each appliance and its power consumption and such system can be implemented in smart home deployments. This feedback can prove beneficial in using energy efficiently and thereby

taking a step towards sustainability.

VIII.   FUTURE Scope

The proposed system has a wide scope to it. Such systems can be installed in residential, commercial and educational spaces to effectively monitor and manage the energy consumption. To further enhance the performance more comprehensive datasets pertinent to specific use-cases can be created. Another important use-case can be the Time-of-Day tariff system which is not yet implemented in India but is operational in many parts of the world and can be implemented in India very soon. More information on this tariff system can be read in [14] The proposed energy management system can be enhanced to include provisions for this system. The algorithm can suggest suitable time for usage of certain appliances to save energy and monetary expenditure simultaneously. Through the installation of such systems, discrepancies in electricity bills can be verified, electricity theft can be curbed and forecasting features can be implemented to forecast energy patterns for future time spans. Thus, the proposed system can be used in quite a many ways to achieve efficient energy consumption leading to financial, environmental and many such benefits.

Declaration

Conflict of interest: On behalf of all authors, the corresponding author states that there is no conflict of interest.

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E-Magazine Creation and Publication Software

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Abstract - **In today's world of digitalization, internet technology has changed many different areas of lifestyle like magazine industry. Although the traditional way of reading from books and magazines has its own benefits it is increasingly getting replaced by people reading the content online with more people connected to the internet than ever before. Hence, an e-magazine creation and publication system plays a crucial role in the modern world. The system is portable, easy to use and helps to create and spread magazines online which can be read by the readers anytime anywhere.**

Index Terms - Technology, E-magazine, Communication, Digital, Online.

I. INTRODUCTION

The internet is a global system that is interconnected to computers and provides various benefits to its users, including access to information from distant documents and databases that may be read and researched to verify knowledge. Educational institutions and scholars are increasingly using it as a flexible medium for delivering online education to remote or on-campus students. It's the age when individuals want to keep in touch through writing blogs and using social media. For decades, the printing sector has played an important role in mass communication, knowledge transfer, and information dissemination. Innovation in technology and software is on the rise. The internet has transformed many aspects of life, including the magazine industry, in today's era of digitization. Despite the fact that printed magazines have long been successful in meeting reader's diverse content needs and reading interests, many readers have recently switched to digital publications. Emagazines are thus becoming increasingly popular as new technological advancements have touched every field, including reading. They are flexible, unique, innovative, and cost-effective and may simply be changed to suit your needs. With the advancement of technology and other new digital publishing methods printed magazines have all evolved into emagazines. E-magazines combine the readability and overview of printed magazines with the advantages of online media, such as regular updates, interactivity, accessibility and flexibility. Despite the obvious benefits of e-magazines, there are numerous obstacles to overcome in order to launch them successfully. In order for everyone to have access to the digital edition, and to create simple or fully monetized e-magazines and publish them online for free we have designed an e-magazine creation and publication software.

II. RELATED WORK

When it comes to digital publication and magazine media, ethical software tools are essential. There are numerous software applications based on electronic magazines which are utilized for publication.
Some applications are referred below :

1. Pixelied
Pixelied is a tool for the most common uses, which have ready-made templates and icons. It can be used for photo editing functions like removing the background of images.

2. Crello

Crello has various features. The Animation Maker suite is its core feature, which provides users with animated templates and objects to use in order to create more engaging images and videos. Crello is free, but its main key features like Animation Maker are only available for Prime subscribers.

3. Pikochart

Piktochart has special feature. It helps you to create your own charts, graphics, and infographics with their library of data visualization templates. Piktochart's free plan offers only limited access to distinct templates, so if you anticipate doing a lot of infographic and chart creation with this tool, it would be worthwhile to upgrade to the paid tier.

4. Canva

Canva is a fantastic graphic design platform. It can be used to make social media graphics, presentations, posters, documents, and other types of content. This platform is completely free to use. Canva Pro and other premium subscriptions are available for users. Canva Enterprise is a paid version of Canva that adds more features.

III. PROPOSED SYSTEM

The fundamental goal of "E-magazine" is to integrate and provide artists with an all-in-one solution. In the proposed system, e-magazine creation and publication software allows you to produce simple or fully commercialised e-magazines and publish them online for free, replacing the printed edition, so that everyone can read it in this age of the internet. Based on your interests, you may either upload current PDFs or start from fresh and improve it by selecting the appropriate template, adding your own text, and embedding audios, videos, photos, and links.
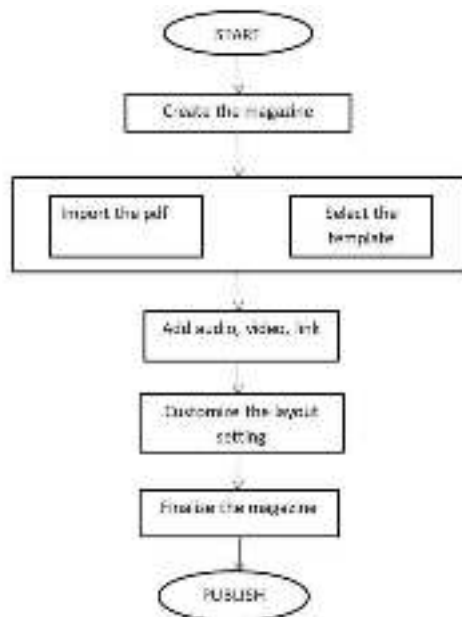
Figure.1 Proposed architecture

IV.   MPLEMANTATION

A. Software

The project is developed using Microsoft Visual Studio 2010.

B. Design

Design is done mainly using HTML tags and divisions. Main form is designed using master form in asp.netand rest of the forms are attached as child forms. We follow three steps for designing :

Select the Views: In this stage, we'll choose the views that are most suited to a specific user interface.

Position the Views: To achieve the intended user interface, we must utilise several layouts such as LinearLayout, RelativeLayout, and GridLayout to position the views suitably.

Style the Views: To make the user interface user friendly and appealing, style the views. We provide cushioning, margin, and colours that are pleasing to the eye.

C. Coding

We create the software in Visual Studio and used XML tags for scripting andto write codes in asp.net , c#, .java file. Also, backend coding is done using SQL server and authentication is done using sql server with jdbc connection.

D. Testing and deploying the app:

The software will be tested in Visual Studio and then deployed on a website using asp.net visual studio.

V.   RESULT

Figure.2 Home page with distinct types of templates, User can browse and select the template from readily available templates.

Figure.3 User can include convenient text, images and video reference links, after selection of a suitable template

Figure.4 After finalizing the content user have to click on create button then magazine will become in printable format.

Figure.5

Figure.6

VI. CONCLUSION

A boom of online communication, including e-magazines or e-zines, has resulted from the shift from getting information via paper to computers and mobile

applications. In this paper, a system is proposed for creation and publication of an e-magazine software. It has the ability to transform a traditional magazine feature into a replacement form in the virtual world. The main aim is to provide interactivity and flexibility in design. The system with pre-built page components, templates and layouts offer numerous possibilities to create professional designs. We present our work and demonstrate that these new formats of magazines have real advantages over traditional.

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Augmented Reality E-commerce Application

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Abstract—**The entire commercial market has transformed as a result of online shopping. Most consumers nowadays tend to shop online rather than going from store to store looking for the perfect deal. E-commerce websites have significantly improved the retail experience. There is a lot that should be done to enhance the e-commerce experience. This paper reflects on the use of virtual reality in conjunction with a smartphone e-commerce application.**

Keywords—augmented reality, e-commerce, mobile application.

I.   INTRODUCTION

In computer programming, augmented reality is the method of merging or "augmenting" video or photographic displays by overlaying valuable computer-generated data on top of the images [1]. Smartphone apps have also been created to monitor details such as building addresses, real estate signage, retail sales deals and restaurant ratings on specific pages as viewed from the device's viewfinder or electronic displays.

Nowadays, online shopping is becoming increasingly mainstream. This paper explores the various possibilities for using Augmented Reality to create an immersive e-commerce experience. We developed an application that would let a user display the 3d model of any product listed on the app.

II.   AUGMENTED REALITY

2.1 DEFINITION

Many publications agree that the use of Head-Mounted Displays (HMDs) is required to define AR [5]. To avoid confining AR to specific technology, we propose that AR be defined as systems that meet the following criteria: 1) mixes actual and virtual elements; 2) is interactive in real time; and 3) is 3-dimensionally registered. While keeping the core components of AR, this definition attempts to allow other technologies, such as mobile technology, to be used alongside HMDs [6]. Interactive rates can be achieved with 2-D virtual overlays on top of live video, but the overlays are not coupled with the real world in 3-D [7]. Monitor-based interfaces, monocular systems, see-through HMDs, and mobile devices are all allowed under this criteria. [9]

2.2 HISTORY OF AUGMENTED REALITY

Professor Tom Caudell and David Mizell of Boeing Computer Services in Seattle invented the term "augmented reality" in the early 1990s [4]. Armstrong of the United States Air Force developed the first completely working Augmented Reality system, Virtual Fixtures. In the same year, Feiner et al. launched the Touring Machine, which was the first outdoor AR system. The user had to wear a backpack that had a computer, a tablet

for input, and various sensors. Many of the core concepts of augmented reality have been employed in movies and science fiction since at least 1984's The Terminator and Robo Cop (1987). These films depict cyborg protagonists whose vision systems provide a constant stream of annotations and graphical overlays that enhance their perceptions of the physical world. AR has become more common as technology has advanced, and smaller devices can now accommodate it. AR is now available to everybody with a smartphone, and it has grown in popularity in recent years. [3]

III.   WORKING:

The application's initial stage will be identical to that of any other e-commerce site. Amazon, Flipkart, and eBay, for example. When a user chooses a product that he or she likes and uses the augmented reality function, the 3d model for that product is retrieved from the database. The AR system will begin detecting the plane and displaying a marker on the detected plane. Once the model has been retrieved from the database.

The 3d model will be spawned in the location of the marker once the user clicks it. After that, the user could scale or rotate the model to his or her preference
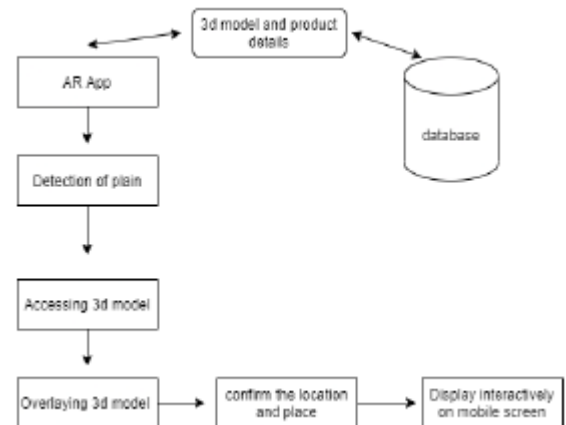
Fig.1. AR system block diagram

Fig.2. Working of AR feature

IV.   IMPLEMENTATION

The target user is anyone who shops on e-commerce applications that wants a better shopping experience.

4.1 REQUIREMENTS:
- Android device with augmented reality compatibility.
- Ample amount of lighting conditions while using augmented reality features.

4.2 FEATURES:
- User authentication using email and password
- E-commerce application features e.g. Products view, product description, buy.
- View in augmented reality support.

4.2 SCREENSHOTS:
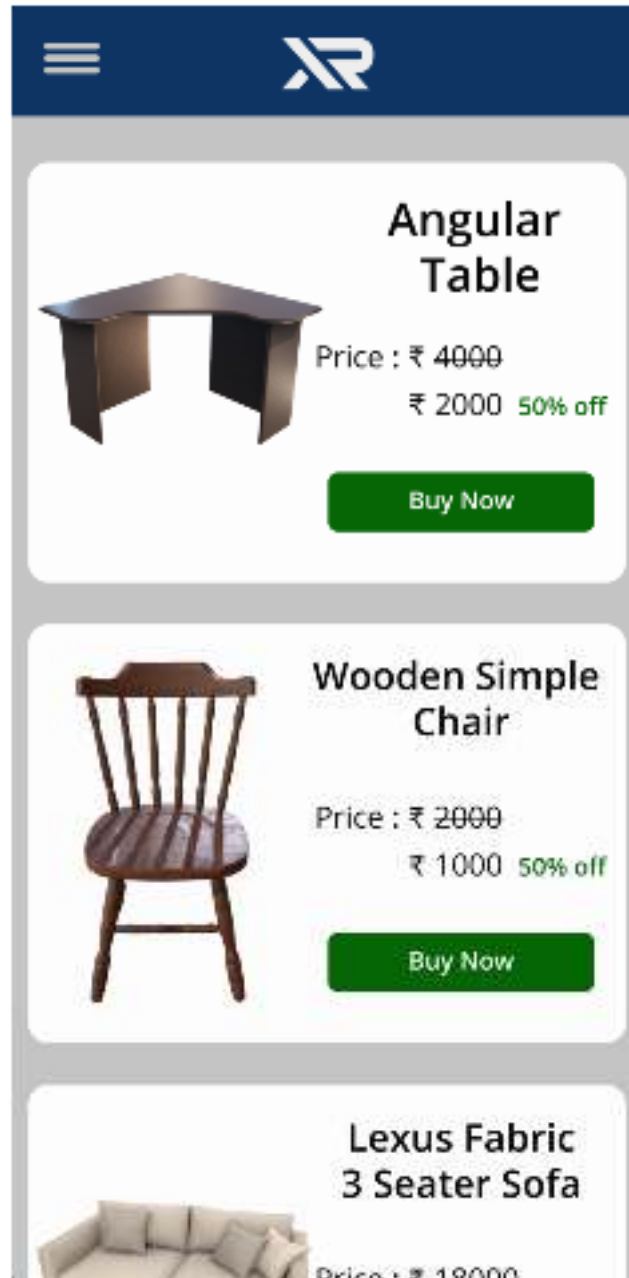
Fig. 3.1. HomeScreen

Fig. 3.2. Product Description

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Fig.3.3. Augmented Plane Detection starts as soon as the view is loaded
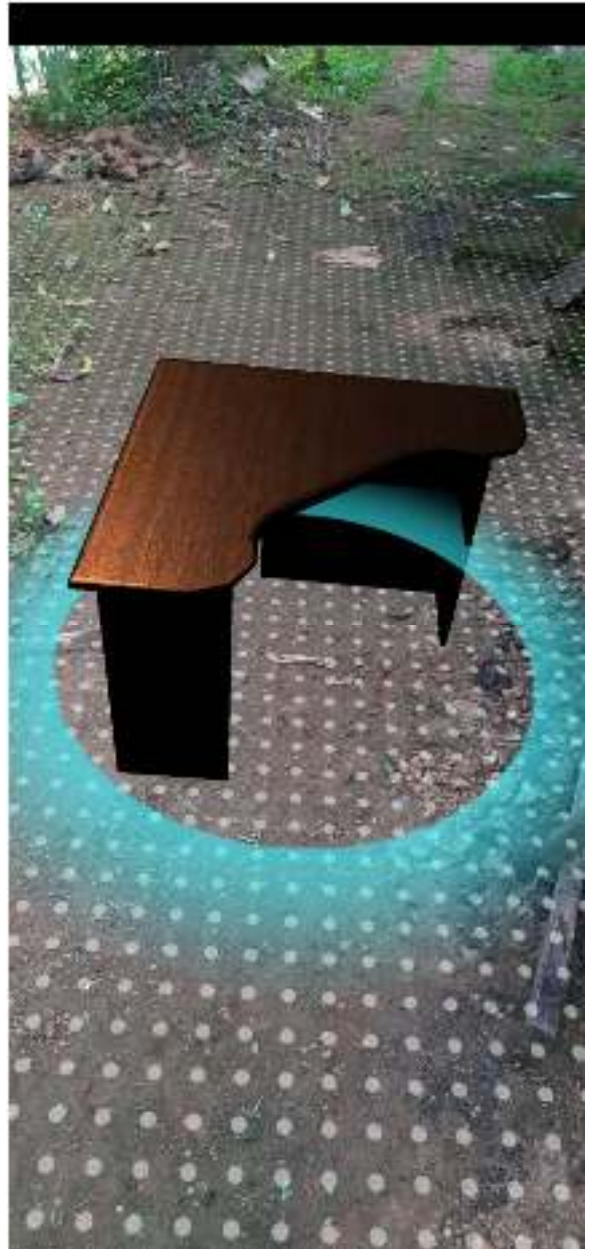
Fig.3.4. The product is spawned at the location of marker on touch

Fig.3.5. The product can then be rotated and moved as desired

V. BENEFITS OF THIS TECHNOLOGY

1. Engage more customers : Brands will be able to engage and interact better with their customers.

2. Makes products more tangible : AR could be used by furniture and home decor companies to show consumers how different items can appear in their houses.

3. Makes shopping more enjoyable: Shoppers will engage with a specific scale of a product in 360 degrees for a more immersive experience.

4. With the use of augmented reality, the likelihood of a buyer returning a product reduces dramatically so they will trial it before purchasing, which benefits the production business.

VI. CONCLUSION AND FUTURE SCOP

While working on this article, we gained a lot of knowledge about augmented reality and mobile application development. E-commerce is an essential part of today's business activities, but it lacks a number of critical capabilities. Our efforts ensure that online shopping is both cost-effective and profitable for both businesses and consumers.

Augmented reality technology has a lot of scope of development in the future.

Stable and faster working of the functionality would be seen in the future.

Photorealistic and advanced rendering: Although many AR applications just require basic visuals like wireframe outlines and text labels, the ultimate goal is to make virtual objects indistinguishable from real ones. This must be done in real time, without the need for artists or programmers to intervene manually. In order to complete this task, new image-based rendering strategies must be considered [10]. AR in all senses: The primary focus of research has been on improving visual perception. In the end, appealing AR settings may necessitate the use of other senses as well (touch, hearing, etc.) [8].

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Augmented Reality Landscape Application

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Abstract - **This research focuses on the implementation of Augmented Reality (AR) landscape applications and the proposed system and explain how a single app that is easy to use by all participants in the project and virtual tour of the building phases.**

Index terms: Augmented Reality, Construction Industry, Landscape Design.

I. INTRODUCTION

The use of Augmented Reality (AR) to blend virtual and physical reality is a practical and efficient method [1]. Augmented Reality Landscape app is a mobile application that runs on the capable Android platform and provides a new method to grasp in some steps of building construction, from its beginning to its end. The application will assist in the comprehension of the building project prior to the commencement of construction work, and will be useful for both construction specialists and non-experts in this sector.

To improve construction efficiency, to comprehend building plans as exactly as possible, and to involve all stakeholders (builders, architects, project owners, etc.).

This research focuses on the implementation of Augmented Reality (AR) landscape applications and the proposed system.

II. HISTORY OF AUGMENTED REALITY

It is unclear how long Augmented Reality (AR) technology has been around, but a few early systems appeared in the 1960s that appear to be similar to today's definition of Augmented Reality.

Professor Tom Caudell and David Mizell of Boeing Computer Services in Seattle coined the term "Augmented Reality" in the early 1990s [4]. Armstrong of the United States Air Force created the first fully functional Augmented Reality system, Virtual Fixtures. That same year, in 1997, Feiner et al. introduced the Touring Machine, the first outdoor AR system. The user was required to wear a backpack containing a computer, a tablet for input, and various sensors. AR has become more common as technology has advanced, and smaller devices can now support it. AR is now available to anyone with a smartphone, and it has become increasingly popular [3].

Mobile games such as Ingress and Pokémon GO, the latter of which has over 100 million downloads worldwide, have gained widespread popularity in recent years [2]. AR has also been implemented with head-mounted displays, such as Google Glass and Microsoft HoloLens, rather than handheld devices.

III. PROPOSED SYSTEM

The proposal is to design a mobile application running on the capable Android platform to provide another way of understanding every step of building construction, from the initial state to the final state, in order to increase efficiency in the field of construction, to understand construction plans precisely and the involvement of all factors (builders, architects, owner project, etc.).

The application will assist in the comprehension of the building project prior to the commencement of construction work, and will be useful for both construction specialists and non-experts in this sector.

The software is made up of five components, each of which performs a different activity and may be used by anyone

New buildings, their size and scale, their impact on the site and the environment, and other information that is difficult to observe throughout the design process can be presented via an augmented reality application.

As a result, the new visual tools have the potential to improve the quality of future construction projects by involving the entire community in picking the optimal solution.

It's also worth noting that the viewing mode will either be based on real-time changes produced by overlapping virtual objects, or it will be based on a virtual image over which virtual objects will be overlapped.

IV. SYSTEM DESIGN

i) Flow Chart
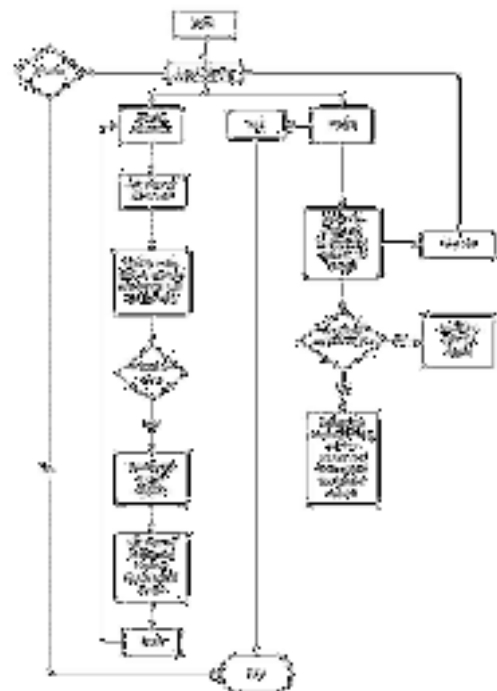
V. WORKING

This application's operation may be broken down into six stages, each of which performs a distinct task and can be

used by any of the participants. It's also worth mentioning that the viewing mode will either be based on real-time changes caused by overlapping virtual objects or on a combination of the two.

STEPS:

Login/Sign up: To utilize the augmented reality landscape app, users must either login or sign up using an email address.

Checking user network: Determining whether or not the user network is capable of loading 3D models.

Selection of a model: After logging in, the user is taken to the home screen, where the model selection tab is selected, and the other tab is the profile screen, where the user can logout, upload an interior or exterior custom model, and browse photographs captured by the user.

Detection of plane: AR Core launches a camera to search for clusters of feature points that appear to lie on a common horizontal surface and then makes the surfaces available to your app as geometric planes. AR Core can also determine the geometric place's border.

Spawning exterior 3D model: When a plane is detected, an indicator appears on the camera screen. When the user selects a location and taps the indicator, the selected 3D model appears. The user can resize, rotate, and take photos of the 3D model

Interior Selection and Spawning: After the selected 3D model appears, the user can hit the interiors button to bring up a screen that shows the inside 3D model, i.e., the interior view of the outer 3D model/apartment. After tapping a selected model, the app spawns the model in which the user can take a picture of the interior.

VI.   IMPLEMENTATION

The main goal of this app is to show civil engineers how a construction project will look after it is completed. They can also be used to display 3D models and even conduct tours, providing clients a clear sense of how a structure will look before it is built. Keeping track of what's going on.

Screen Shots

Login Screen

Sign Up / Register Screen

Home Screen
(Model Selection)

AR camera (before spawning the model)

Profile Screen

AR camera (After spawning the model) Rotate and fixed
scale options

21

Custom Scale

Camera for taking snapshots

Joystick for moving 3D Model

Custom Scale model captured image Of the model

Interior selection Screen

Interior model AR view

VII.   BENEFITS

1. Accuracy is crucial in every project to avoid wasting money and time due to alterations made afterwards. Before a project is implemented, AR gives teams an overview of the entire project, including all of its details and exact measurements .

2. Architects, project managers, and engineers have enough data at their disposal to ensure accuracy and speed. They can also utilize augmented reality to go through each project phase and detect faults before they become obvious late

3. Augmented reality benefits even the best air conditioning businesses with years of construction experience. They carry out their tasks using augmented reality. It makes an exact reproduction of each aspect of the AC system for the full building or construction project.

4. Augmented reality can preserve the external design in addition to displaying architecture models and enabling for easy 3D model change on the building interior. As a result, with just a few taps, an expert may effortlessly remove or rearrange walls, as well as change the design.

5. Architects   and   project   designers   can   utilize augmented reality to accurately examine a design since they can walk around the proposed project, discover any design defects, and make any necessary changes in only a few touches.

6. They can also modify or add any design or structural elements they desire. It eliminates any guesswork, which was an issue in the past when this type of inspection was only done after the structure was built and a single error might be costly.

VIII.   CONCLUSION

The main conclusion of this article is that Augmented Reality is a technology with potential in the field of construction that should be capitalized on this type of applications that revolutionize building design in the current era. Augmented reality can give app users a lot more information than the traditional presentation of past work plans. As a result, designed application combines a number of useful modules that can be previously simulated using various images, Augmented Reality and a mobile device. The secondary conclusions that can be drawn from all of the analyses presented are that Augmented Reality and technology have limitless potential in this field.

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Exploration of Eye Tracking Technology and its Applications

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Abstract – **Eye tracking technology can be used for recording the eye positions and the movements of the eye using the optical tracking of corneal reflections. The data collected using the eye tracking is used in wide variety of fields nowadays. Analyzing the eye movements and gaze positions are possible in both 2D and 3D environments. Using eye tracking, it is easy to analyze and process the visual information which can be used for diagnostic and interactive applications. There are many features like fixations, saccades , scan path, gaze point and area of interest which are extracted from the eye tracking data that can be used for research. This paper will discuss about the technology used in eye tracking and the different algorithms used for eye tracking data extraction and the metrics that can be used. . Also the paper will have a explanation on the different areas of application where eye tracking is used.**

Keywords: Eye tracking, gaze positions, optical tracking

I. INTRODUCTION

The idea of eye tracking to understand the stimulus offered by it is not something new. It has been in existence for more than hundred years. In the early days of eye tracking research, the eye trackers were huge and cumbersome. In the year 1879, ophthalmologist Luis Emile Java observed some connection between the movements of the eye and how a reader engages with text. . According to Eyesee, consistent studies led to the development of the first eye-tracker built by Edmund Huey. That was a very difficult and complicated device to use. But nowadays, eye trackers are as thin as a pencil and it has become a very flexible device to use. One more advantage of this eye tracking technology is that it is non-invasive in nature. Eye tracking technology measures, attention and interest of an individual in responding to the environment and so it is a
great tool for any kind of human behavior research, and it is applied in a variety of fields such as education, medicine, gaming, psychology, online marketing, usability research and so on.

II. LITERATURE REVIEW

Eye tracking can be traced back to many years. Emile Java, a French ophthalmologist
, in the year 1879 analyzed the eye movements when the text was being read. Since there were no sophisticated instruments, a mirror was used to observe the eye movements. He stated that eye movements are not continuous but rather made of many rapid movements called saccades along with stops called fixations. A better eye-tracking device was developed by Dodge and Cline in 1901 and was based upon corneal reflection. The system used a photographic plate and tracked only thehorizontal movements of the eye. Another American psychologist named Charles H. Judd developed a photo device. That device could track eye movements in both directions
, horizontally and vertically. In the year 1908, Edmund Huey developed an eye tracker device. He used a small contact lens provided with a hole for the pupils and used an aluminium pointer which was connected to the lens to observe the gaze direction while reading. There were many studies conducted in the later years to understand the relationship between eye movements and cognitive abilities. But in the 1980s eye tracking research area took a great turn because of the advent and proliferation of computers. Using computers they could feed in large amount of data and try to understand how to use it. So lot of application areas for eye tracking technologies opened up.

Nowadays, the size of a eye tracker is smaller than that of a pencil and with lot of gaming hard wares made available to the people they are not very expensive too. Cameras are available in PCs, laptops, mobiles and so on and this non invasive method of reading human behavior is available everywhere. The only question is how can we make use of this technology to the benefits of the mankind. We can see that with respect to hardware there is a large increase in its availability. But what about the software and the algorithms to understand the data. With the advent of big data and usage of machine learning and deep learning algorithms, it is possible analyze large amount of data and frame questions which can solve lot of problems. So, both with respect to hardware and software, we are at the right time and age to make use of eye tracking data.

III. DEVICES USED FOR EYE TRACKING

There are three main types of eye tracking devices. They are :
i) Screen-based
Using VR headsets(also called as mobile)
iii) Webcam-based

1. Screen-based

They record eye movements at a distance. There are no devices attached to the respondents. These screen based eye trackers could be mounted below or placed close to a computer screen. The respondents are seated in front of the eye trackers. That does not mean that the respondents cannot move or not move their head at all. They will not feel very restricted. Screen-based tracking devices have very high precision for recording the data. They are best suited for observations of any screen-based stimulus material like pictures, videos, websites etc.

Fig 1 : Eye Tracking Device – Screen Based

2. Glasses

The glasses record eye activity from a very close range. They are mounted into lightweight eye glass frames. The respondents need not be seated in one place. They can walk around freely. They are useful for observations of objects and task performance in any real-life or virtualenvironments. They can be used in such places where one can move freely.

3. Webcam- based

This technology is considered slightly inferior to infrared based eye trackers. The advantage is that it is cheap and ubiquitious. Many applications have been developed where data from webcam based eye trackers are collected and used.

IV.   EYE TRACKING METRICS

Eye tracking measures the horizontal and vertical eye movement corresponding to a particular stimulus. It could be observing a product, reading a text, going through a website or playing a game. The movements have to be recorded of both the left and the right eyes. So, at any particular point of time, one needs to record the lx,ly ,rx and ry referring to the left eye's x and y coordinates and right eye's x and y coordinates. After recording the eye movement, one can see that the raw data needs to be converted to certain useful metrics or features for further research work. There are many eye tracking metrics which one will be able to decipher from the raw eye tracking data. The challenge in eye tracking research is understanding the relevant eye metrics Some of the metrics are

1. Fixation – The time or period taken for processing a particular point in the image by our eyes. So a fixation will be a cluster denoted by a series of gaze points. These gaze points should be close in time and range. This is a time period where the eye is rather still and that is why the term fixation. Normally fixation duration is between 100 to 300 milliseconds.

2. Saccade – The time interval between two fixations is called saccade. This is the period where the eye is moving fast. So it refers to a rapid eye movement where there is a redirection of the visual axis to a new location. The best example to understand

saccade is to understand how our eye movements happen when we are reading a book. They are not smooth across the line but instead our eyes jump and pause generating a number of saccades. The unit of measurement of saccades is angle velocity. Saccades are used to understand reading behaviors between different types of readers.

Figure 2 : Difference between Fixation and Saccade

3. Gaze points – Gaze points indicate what the eyes are looking at. If any eye tracker collects data with a sampling rate of 60 HZ, one will end up with 60 individual gaze points per second. It refers to one row of information captured by he Eye Tracking device.

4. Gaze duration – It includes several fixations and also a relatively small amount of time for short saccades between fixations.

5. Area of interest – The area defined by a research team as per their needs such as area of a display device.

6. Scan path – Spatial arrangement of a

sequence of fixations .So the sequence of fixation-saccade-fixation is called as scanpath. This was defined by David

Noton and Lawrence Stark in 1971.

7. Regression – Regressions are right to left movements or movements back to the previously read lines of text.

8. Smooth pursuit – This metric means what its name implies. It is smooth movement of the eye instead of jumps.

9. Heat maps: Heat maps shows maximum attention area of the stimulus. One will be able to understand where the subject is concentrating in a image looking at the heatmaps.

V.   EYE TRACKING ALGORITHMS

The raw eye movements should be converted into useful features for statistical analysis. Converting the raw data into useful features is a complex task. There are lots of advantages of converting the raw data into the fixation identifications. It is very crucial to identify the feature extraction done correctly because identification is a very critical aspect of eye-movement data analysis. If the feature correction is done incorrectly, then there will be bias in the interpretation of the data. There are different ways in which these fixational algorithms can be classified. There can be two main categories first. First one is based on spatial criteria. The spatial criteria divides

algorithms in the use of velocity, dispersion and area-of-interest information. The temporal criteria classification of algorithms is based on their use of duration information and their local adaptivity.

1. Velocity-based algorithms

Velocity based algorithms are many But here we are talking about two of them . In Velocity-Threshold Identification(I-VT) fixation identification algorithm one calculates the point-to-point velocities for each point in the protocol. In order to calculate velocity at a point, it is computed as the distance between the current point and the next or previous point. Each point is then classified as a fixation or saccade, if the point is below or above a simple velocity threshold. The next one is HMM Identification. HMM stands for Hidden Markov Model. This uses probabilistic analysis to identify the best identifications for a given protocol. The I- HMM algorithm uses two-states. The states represent the velocity distributions for saccade and fixation points. It is considered that I-HMM perform better identification than I-VT.

2. Dispersion-based Algorithms

These algorithms works on the principle that the fixation points, since they have low velocity, are clustered closely together. Dispersion based algorithm identifies fixations as a group of points with a particular dispersion. Dispersion-Threshold Identification(I-DT) and MST identification(I-MST) are both based on dispersion based algorithms. I-DT algorithm identifies fixations as groups of consecutive points with a particular dispersion. I-MST is based on minimum spanning trees(MSTs). Minimum Spanning Tree is a special kind of tree that minimized the weights of the edges of the tree. In this algorithm a MST is constructed using Prim's algorithm for a set of points.

3. Area-based algorithms

In Area-based algorithms, fixation identification is considered for fixations that occur within specified target areas. The target areas are rectangular regions of interest. They represent units of information in the visual field.

VI. AREAS OF APPLICATION OF EYE TRACKING

There are many different areas in which eye tracking can be applied and some of them are mentioned here.

1. Psychology research

From the earlier days of eye tracking research, scientists were curious to understand the relationship between eye movements and cognitive ability. It is said that children with certain learning disability like Dyslexia, exhibit a different behavior in eye movement compared to the ones without any disability.

2. Medical research The data collected using Eye tracking movement is used along with other conventional research methods for diagnosing many diseases. Some of them are Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), Obsessive Compulsive Disorder (OCD), Schizophrenia, Parkinson's and Alzheimer's disease.

3. Market Research

During the past few years, eye tracking for market research has become increasingly important. Many leading brands use the tool to evaluate their products, designs, advertising or even the shopping behavior of their customers to optimize the overall customer experience.With eye tracking, it is possible to measure attention to brands, products, and their key messages as well as the ease or difficulty of store navigation.

4. Packaging Research

There is a lot of money invested into designing packages of a product before they go to market. Unless the customer finds the product design visually appealing it may not be very successful even though the product as such is good. This is the case especially for fast moving consumer goods because the competition is very fierce.It is necessary to make sure that the package of a product gets enough visual attention on the shelves, meaning it has to stand out from the others. Eye tracking is basically used here for designing the packages and understanding the customers' preferences.

5. Gaming

Gaming is the running of specialized applications known as electronic games or video games on game consoles like X- Box and play station or on personal computers. Gaming is a billion dollar industry and used by a major population in the world. So lot of research is happening to understand how eye tracking can be used for developing better gaming experience. Eye movement is a source of input. When the game knows where a gaze point of the user is , it will be able to know more about the player's instincts and intentions.

VII. EYE TRACKING DATA AND ITS REPRESENTATION

The following eye tracking data is collected from one of the eye tracker application available in Apple iPad. The application is aimed at improving the diagnostic process of ophthalmic analyzes. The application will support preliminary diagnostics on angular velocity eye pupils measuring. We get two kinds of data from the above mentioned application. One is basic data and the other one is speed data, derived from the basic data. The eye movements are recorded for both the left and right eyes. The data is depicted in the graph format for easier understanding. From the data available, useful features can be extracted using appropriate algorithm Also with the popularity of Machine Learning and Deep learning algorithms, meaningful questions can be formed and the answers predicted using the same.
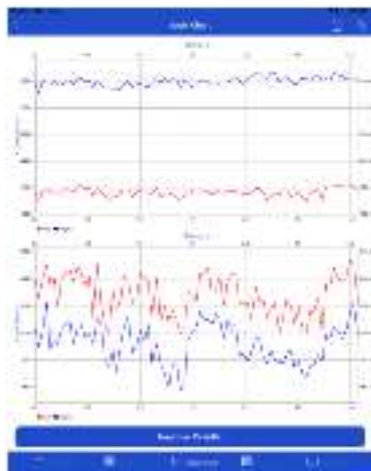
Fig 3 : Basic Eye Tracking Data and its representation
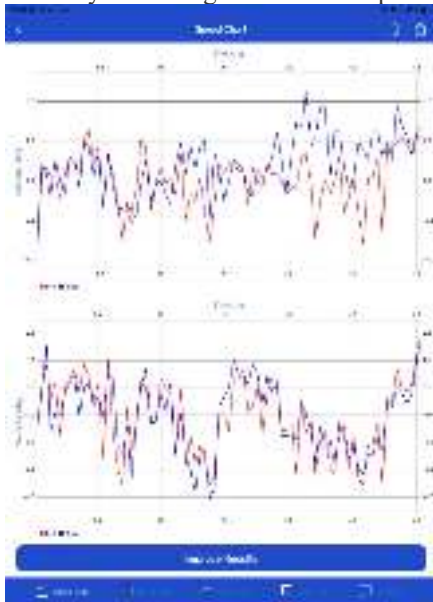
Fig 4 : Angular Velocity data and its represenation

VIII.   CONCLUSION

The field of eye tracking has enormous applications and poses wonderful opportunities to the researchers. Although the idea has been persisting for many years, improvements in hardware and software capabilities has helped the cause. In terms of hardware, the size of the device has come down and it is very small and easy to use. In terms of the algorithms used for feature extraction, there are many developments.

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Smart Gloves for Deaf and Dumb People (gesture conversion to text and speech) Using IOT

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Abstract -**Communication is the only medium by which we can share our thoughts or convey the message but for a person with disability (deaf and dumb) faces difficulty in communication with normal person Because of this, a person who lacks in hearing and speaking ability is not able to stand in race with normal person Communication for a person who cannot hear is visual, not auditory Generally dumb people use sign language for communication but they find difficulty in communicating with others who don't understand sign language So there is a barrier in communication between these two communities This work aims to lower this barrier in communication The main aim of the proposed project is to develop a cost effective system which can give voice to voiceless person with the help of Smart Gloves It means that using smart gloves communication will not be barrier between two different communities With the help of these gloves disabled person can also get chance to grow in their respective carrier Using such devices by disabled person also makes nation grow Individuals communicate with one another to pass on their thoughts to the general population around them There are 2 78 of the total populations of India who can't speak Gesture based communication is really a mode of correspondence for the general population who are either deaf or deaf mute Ordinary individuals don 't become familiar with the gesture based communication It causes conveyance gap between deaf dumb and normal people The past system of this project involved using image processing concept But the downside of these past frameworks are projects were non portable and excessively costly . The aim behind this work is to build up a framework for perceiving the gesture based communication which provides interaction between people who are deaf dumb and normal people thereby diminishing the interaction gap between them Generally hearing impaired people use linguistic communication based on hand gestures with specific movements to represent the ideas to others The pr**

Keywords—Blood bank, Internet of Things, Arduino,GSM

I. INTRODUCTION

India constitutes 2 4 million of Deaf and Dumb population, which holds the world 's 20 of the Deaf and Dumb Population This person lacks the amenities which a normal person should own The big reason behind this is lack of communication as deaf people are unable to listen and dumb people are unable to speak This decreasing ratio of Literate and Employed Deaf and Dumb population is a result of the physical disability of hearing for deaf people and disability of speaking for dumb people so it yields to lack of communication between normal person and Deaf and Dumb Person It actually becomes the same problem of two persons which knows two different language no one of them knows any common language so its becomes a problem to talk with each other and so they requires a translator physically which may not be always convenient to arrange and this same kind of problem occurs in between the Normal Person and the Deaf person or the Normal Person and the Dumb person To overcome this problem we introduce a unique application Our application model is a desirable Interpreter which translates Natural English Sentences as, an text input by Normal Person for Deaf Person and Sign Language in form of Gesture by a Dumb Person to Synthesized English Words which have a corresponding meaning in Sign Language which interprets a particular thing as an Audio Output for Normal Person This will help Normal and Deaf and dumb communities by removing the communication gap between them General deaf people have difficulty in communicating with others who don't understand sign language Even those who do speak aloud typically have a "deaf voice" of which they are selfconscious and that can make them reticent The Hand

Talk glove is a normal, cloth driving glove fitted with flex sensors along the length of each finger and the thumb The sensors output a stream of data that varies with degree of bend The output from the sensor is analog values it is converted to digital and processed by using arduino uno which is also connected to speaker and LCD screen giving output as voice and words are displayed on lcd

II. OBJECTIVES

The main objective of this project is to help deaf anddumb people by removing communication barrier so that theyare not restricted in a small social circle and are able to convey their feelings and emotions whenever they want. Also it would be helpful in educational and health issues relatedto

deaf and dumbpeople.

III. LITERATURESURVEY

Many scientists are working in field of gesture recognition Keeping the same concern in mind many developers have come up with innovative systems Few of such systems are as follows A different method had been developed by Archana S Ghotkar, Rucha Khatal, Sanjana Khupase, Surbhi Asati and Mithila Hadop through Hand Gesture Recognition for Indian Sign Language consisted of use of Cam shift and HSV model and then recognizing gesture through Genetic Algorithm in the following applying cam shift and HSV model was difficult because making it compatible with different MATLAB versions was not easy and genetic algorithm takes huge amount of time for its development A method had been developed by P Subha Rajan and Dr G Balakrishnan for recognizing gestures for Indian Sign Language where the proposed that each gesture would be recognized through 7 bit orientation and generation process through RIGHT and LEFT scan The following process required approximately

six modules and was a tedious method of recognizing signs A method had been developed by T Shanableh for recognizing isolated Arabic sign language gestures in a user independent mode In this method the signers wore gloves to simplify the process of segmenting out the hands of the signer via colour segmentation The effectiveness of the proposed user independent feature extraction scheme was assessed by two different classification techniques namely K NN and polynomial networks Many researchers utilized special devices to recognize the Sign Language Byung woo min et al presented the visual recognition of static gesture or dynamic gesture in which recognized hand gestures obtained from the visual images on a 2 D image plane without any external devices Gestures were spotted by a task specific state transition based on natural human articulation Static gestures were recognized using image moments of hand posture while dynamic gestures were recognized by analysing their moving trajectories on the Hidden Markov Models (HMMs M Delliraj and S Vijaygakumar propose a system with a

IV. EXISTINGSYSTEM

In existing system there is no circuit is used to announce their thoughts of physically challenged peoples And gesture based papers or circuits are not available in markets In existing method is sign language it couldnt understand all people for communication There after a circuit is used to design predetermined postures are captured and matching the captured image with deaf dump peoples sign languag

V. WORKINGPRINCIPLE

The work of this paper start from movement of hand gloves where the flex sensors are attached, and the value of sensor changes when its experiences the bending. The flex sensor is another type of potentiometer are attach to the fingers when we bend the figure the value of the sensor get changes. The changing value of the sensor is depend upon the resistance and applied angle of the bending when we bend the sensor at some particular angle we can see the value of the resistance is increase and accordingly the output get reduced [7]. On the other way we can say that its like a inversely proportional when the resistance of the sensor is increase at that instant the value of output decrease and accordingly we can make paper by getting the advantage of this process.

VI. METHODOLOGY
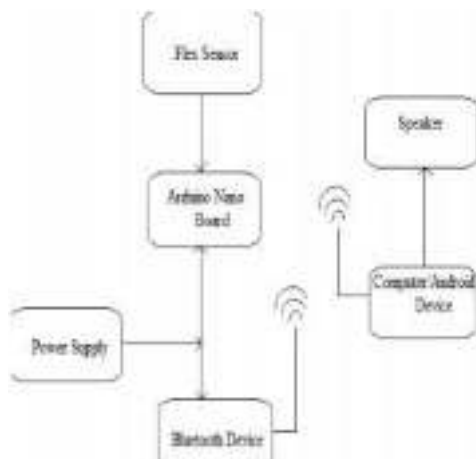
Fig1. Blockdiagram

The work of this paper start from movement of hand gloves where the flex sensors are attached, and the value of sensor changes when its experiences the bending. The flex sensor is another type of potentiometer are attach to the fingers when we bend the figure the value of the sensor get changes. The changing value of the sensor is depend upon the resistance and applied angle of the bending when we bend the sensor at some particular angle we can see the value of the resistance is increase and accordingly the output get reduced [7]. On the other way we can say that its like a inversely proportional when the resistance of the sensor is increase at that instant the value of output decrease and accordingly we can make paper by getting the advantage of this process. these readings with the predefined values and thegestures are recognized and text is displayed This text output obtained from the sensor based system isthen sent to the voice module The voice moduleconsists of eight channels, in which eight words can be recorded Voice recording and play back module is used for giving audio information to the person So that sign alphabets will be available in audio format through speaker
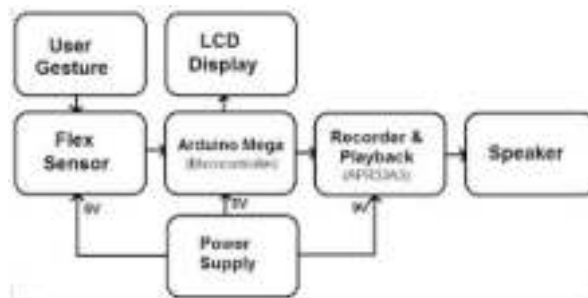
Fig2. Workingdiagram

VII. WORKING

The data glove fitted with CLS (conducting line sensor sensors along the length of each finger and the thumb The line sensor output a stream of data that varies with touching in different position CL sensoroutputs data strea depending on the touching position produced by the sign A group of signs that represent words are collected from the data set of this system The output data stream from the CLS is fed to microcontroller where it is processed and converted into digital form The microcontroller compare this readings to look up the table stored in theInternal program memory which ever reading is closest to the look up table microcontroller will select that word After this microcontroller will search the word for wav file with similar name That text will be displayed on LCD
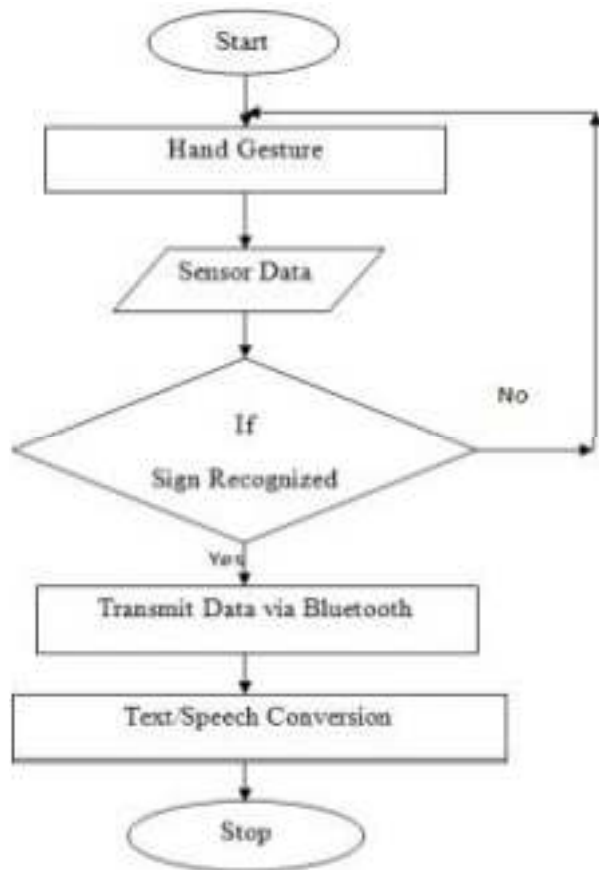
Fig 3. FLOWCHART

Flow Chart working description :When power supply of 5 V given to flex sensor , Arduino Mega and Recoder so when user makes gestures with use of flex sensor the information gets transmitted to arduino mega which is connected to LCD display and recorder so the aplhabets is shown in display and also data is recorded in recorder futher the alphabet is audible through speaker which also connected toarduino.

VIII. RESULT ANALYSIS

This paper is a useful tool for speech impaired and partially paralyzed patients which fill the communication gap between patients, doctors and relatives

1.Asitisportable, costeffective.

2.Requireslowpoweroperatingonasinglelithium-ionrechargeablebatteryandhavinglessweightandrobustgiv espatientlibertytocarryitanywhereattheirwill.

3.Thispaperwillgivedumbavoicetospeakfortheir needs and to express their gestures

1. Hence this paper is an attempt to make it easy to understand the actions of the dumb people by getting the output in the form of text and voice

2. The text is also forwarded as SMS via Bluetooth or modem for better convenience and for security purposes

IX. FUTURE SCOPE

1) In this project many types of other applications can be added with using the different type of sensors like Heartbeat sensors for heartbeat monitoring and Temperature sensor for body temperature monitoring.

2) Using the Xbee Module we can create a wireless zone and this device may communicate with the other devices also.

1) Using the IOT technology we can connect this for live updates of the patient or person like locations, status body conditions etc.

1) With the help of different gestures commands,different other commands can be added.

1) For more reliable and low complexity of the circuit microcontroller can be replaced by the Arduino or other Advanced Microcontrollers

X. CONCLUSION

Sign language is a useful tool to ease the communication between the deaf and the mute community and the normal people Yet there is a communication barrier between these communities with normal people This project is useful for differently abled, speech impaired and paralyzed patients who cannot speak properly This work is done to check the feasibility of recognizing sign language using flex sensor and accelerometer gloves and displaying the data, which proved to be an efficient system The main feature of this research work is that the gesture recognizer is a standalone system applicable in daily life and for biomedical purposes In past the implementation of gesture recognition has certain drawbacks Thus we are planning to make a digital glove This system will consist of Arduino Flex sensor Accelerometer and Voice module to convert hand gesture into audible speech Thus this project will be used by dump and deaf people asAssistant for themselves

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Smart Shopping System

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Abstract: **It has been seen that Supermarkets witness Long lines during the pinnacle of shopping period. These long lines have brought about the loss of time both for the customers also, the shopping center chaperons. Thus, the objective of this paper is to plan and build up an Intelligent Smart Shopping Cart with the sole goals of limiting shopping time and to boost shopping involvement with a general store. This paper presents an Intelligent Smart Shopping Cart System where the aggregate sum the customer needs to spend is ascribed into the smaller than usual framework implanted in the shopping trolley. Each item picked has a RFID label which has a doled- out cost. At the point when the items dropped in the brilliant shopping basket comes to the greatest information sum or surpasses the most extreme information sum, the red visual pointer begins to flicker and the ringer signals to advise the customers of surp assing asfar as possible while shopping. The green visual pointer additionally flickers when a customer shops beneath the attributed sum. In the event that any item is eliminated from the shopping trolley, the sum is deducted from the created small framework implanted in the shrewd shopping basket and the ringer likewise blares to advise the Shopper of the derivation. The segments utilized for this exploration are RFID Tag, RFID Reader, Liquid Crystal Display (LCD), Push catches/Switch, Reset button, Visual Indicator, Wi-Fi module also, a PIC microcontroller.**

Keywords: RFID Tags, Reader, LCD, smart-cart.

I. INTRODUCTION

Technology has improved rapidly and looking at the after COVID situation, people are mostly reliable on tools and application through software. Mobile application has been increasingly dominating from healthcare to financial banking to shopping online. Everything is accessible through one click. Due to the pandemic, people will avoid going to crowded place and would look a more convenient way for shopping. Grocery and essential shopping are the needs of day-to-day chores and in order to adapt time saving measure, technology has proven to be a boon. Even though online shopping has been in demand, local customers still prefer offline shopping to check the product quality and buy stuff conveniently. But this method is tedious as people have to wait in long queues for their product to be scanned by cashier also the crowd surrounded at the time of shopping. This motivated us to invent a smart shopping application which will meet all its requirement and will make the shopping time saving and feasible.

II. MOTIVATION

The society has drastically changed because of the advancement in the field of technology. The adoption of various technologies has simplified our day-to-day chores like accessing education, medicine, transportation, and even shopping. By using smart applications, it has saved us a lot of time and effort. When we took a survey, it was found that the maximum people who go for outdoor shopping are mainly between 23 to 50 years of age and the main problem that they face is a crowded place and time that has been spent waiting in long queues. But when it comes to choosing between online shopping and offline shopping, there is a

50-50 choice as people are mainly concerned with product quality and return policy in online shopping. This concern of the people led us to an idea where they can get the benefits of online shopping in outdoor shopping and hence avoid

issues like crowded areas, waiting in long queues, or security breaches. By using our application, the user will have various options to explore like to book a slot, to create a list of the items they want to buy, easily navigate a particular product in the crowded supermarket, get notification of recent discounts and sales, and easily pay for the products they have bought without even standing in the queue. This will motivate people to opt for a supermarket experience that has been declining in the past few years.

III. RELATED WORK

Automatic Bill Generation of Products using digital signatures and QR codes [1]: The customer forwards the selected product list to the server and the response received enables the consumer to decide based on the authenticity. A real time capturing system using QR code in Android smart phone. QR code verifies products by capturing it through the smart phone, then decodes and sends it to the server for authentication.

Smart Shopping using Smart Trolly [2]: Whenever the

customer puts a product into trolley, it will get scanned by RFID reader/Scanner and product price and cost will be displayed on LCD display. It is less time consuming as compared to regular billing technique. It is more reliable and provides ease for shopping

Smart Shopping Cart for Automatic Billing in Supermarket [3]: This RFID system can be used in shopping malls and can be used for security applications by keeping data confidential. The chip and antenna are sandwiched between a printed label and its adhesive backing is inserted into a more durable structure.

Smart Shopping - An android based shopping application [4]: Customer scans the unique code at the entry of retail shop, after which the items are scanned and details from the database are accessed once sent. The barcode which is read will be decoded and then converted into any specific

number that will be unique for every product after

customer has scanned the barcode; a web service will retrieve data from the database

Design and Implementation of an Android Application for Smart Shopping [5]: The user is asked to connect the

device to the shopping cart. On pressing the 'connect' button the application checks for nearby devices whose Bluetooth is enabled. The devices get paired to it and the connection is established. Window is aided with RFID the buttons in

'manual' control page are programmed to send data streams to the shopping cart via Bluetooth. Each button sends a different set of data. Based on the received data, the microcontroller can process the signals and facilitate movement of the cart.

Improvised Smart Shopping Based on Android Application [6]: This Application is designed with basis of two mode online (inside the shop) and offline (outside the shop) in each scenario the implementation is described with facilities of payment, offers, invoice generation and history of purchase. It makes use of barcode scanning. The application is designed to work in the online mode if and only if the mobile is connected to the particular Wi-Fi and the battery life is greater than 25%. If the customer in unable to scan the barcode due to various reasons the code can be manually entered.

IV. SYSTEM ARCHITECTURE

Our system is designed to aim at the shopping malls. The user has to authorize himself/herself by registering in the app and logging in at the time of shopping. While user has reached his/her destination for the shopping, the app will prompt for a to-do-list option, for the user to quickly make a list of items for purchase. If the user doesn't want, they can skip the option for later use. Then there is a navigation option which will allow users to navigate to a particular product, while he/she is purchasing our app will recommend similar product in vicinity or through to-do-list and will remind user to buy the product. User can also get the product details by clicking on that particular product. The user then has to scan the barcode by himself/herself to ensure the product they selected. If the scanner doesn't work, the user can manually enter the barcode number. In the setting options, user have to include their payment details for automatic payment after scanning the barcode. If the transaction fails due to any reason, then the user will be informed and it will be taken care. If user tries to go out without paying for the product via integrated payment method, the retailers can check upon it as our application will make a beep sound which will be an indication of failure of payment, in this way security has been taken care. Before going to shopping mall, user can check through app if there is an availability for shopping to avoid crowd. Using session for each user, app will generate a token for that particular user who wants to shop and through which the shopping mall vendors can allot a specific time for users to enter. In this way social distancing can be taken care and people don't have to wait in long queues for their turn. There will also be a feedback and review system in app to know user's satisfaction and infelicities which can be improve in further development.
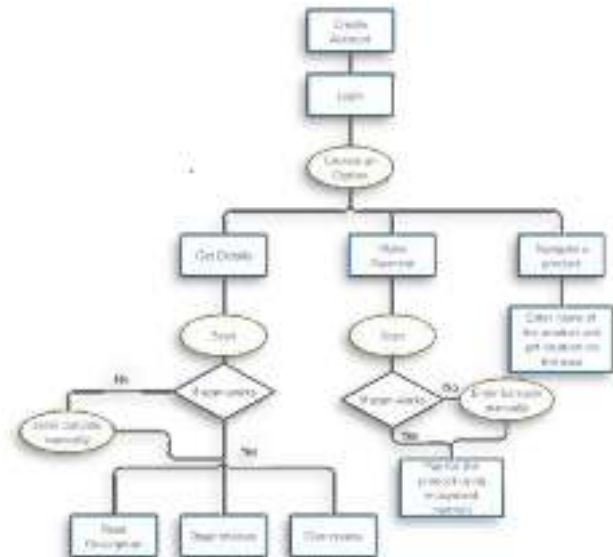
4.1 Design

The design and layout of our application is discussed in this section. The app has 5 major features like book your slot, bill, scan, navigate, and create a shopping list. In book your slot feature, the user can book a time as per their convenience and do shopping without waiting in the long queue. In the bill feature, the user has to scan a product and subsequently pay for it using the integrated e-payment system or if the scan feature is not working, the user can then enter the barcode manually and proceed for payment. Instead of standing in long queues, one can save time by using this app and has the option of online payment so no need to worry about the change of money. With the scan option, one can scan the product and gather all the necessary information like ingredients present in a food product or if the product is tech- related then check for made in which country and warranty period. In the navigate option, the user can easily spot a particular product in the crowded supermarket. This will avoid wasting time in searching for the product and the user can easily find the necessary item using this navigation tool on our application. In the create a shopping list option, the user can jot down their products that they want to buy so the app will shuffle the products according to the arrangements of items placed inside the supermarket. This will ease the shopping for the user and avoid missing any product off the list.

V. IMPLEMENTATION

The flow of the implementations starts with User Login if the person is already registered or else, they have to

register to use the app. Once the user is logged in, they are prompted to turn on their Bluetooth this feature is used to determine the proximity of the products as well as other users within the range. The registered users should link their Customer ID to the Cart ID which they are using. In order to keep track of time taken by the customers they are prompted to choose the time limit in the app, after that they can proceed their way to do the purchase. There will be an optional feature as 'To do list' which can be set by the customers according to the arrangement of the products in the shop. They can be able to list their products which they are going to buy in the list and can proceed accordingly. Users can also search the products using search bar and see them on the map for navigation. It also shows them the sales and offers in that particular shop. The RFID chip which is embedded in the trolly will read the product details and count them when a customer put them inside the trolly after that all the details will be displayed on the app. They can also remove a product from the trolly and the same will be reflected in the app. After the completion of all the purchase, payment will be done through integrated payment gateways and a bill will be generated for the same.

VI.   CONCLUSION

Our project "Smart Shopping Application", as it suggests and tries to offer a smart application to mitigate users' difficulties while shopping. This application targets on reducing the shopping time of customers by automated payment integration through which customers don't have to wait in queue for long hours. We conclude that our system is time-saving with faster checkout process. Also, this reduces the labor requirement at the counter.

VII.   FUTURE WORKS

The word smart means to be well equipped and be well versed in situations. So future works are aimed at incorporating the following features into the application.

A customized user interface will be provided to the app with elevated features. To make the app more productive, hosting it on cloud platforms will be investigated. The app will be designed to suggest personalized offers and discounts to users based on customer shopping patterns as soon as the customer enters a particular supermarket. Security can be improved by using a camera module and sensors, which scans the weight of the cart and products and automatically checks if any product is left to scan and pay for it.

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Tourism App development for thanjavur city

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Abstract – **This paper presents the development of the Tourist Guide, a location based tourist guide application for the outdoor environment. Our focus for this project is on software support for location based applications; we are not just interested in the location but also other elements of the user's context, such as buildings in view, attractions and equipment near by, such as public telephones and toilets. In this paper we will describe the Tourist Guide system and discuss the processes involved in the development of this application. More specifically, this paper will look at the design and usability issues.**

I.   INTRODUCTION

We have been investigating location based tourist applications targeted at off-the-shelf hand held devices, such as the Compaq Aero. The hand held device is augmented with Global Positioning System (GPS) to provide regular updated information about the user's current location. Such an application enables the user to participate in a travel expo (a self guided tour of a specific area) that will display detailed information about specific features linked to their current position. This will include information about: where they are, attractions nearby, and details about specific buildings.

Aims of the Project

The main aim of this project was to develop a context sensitive travel expo application. The design aims of the project were as follows:

1) Use off-the-shelf hardware and software components.
2) Simple and easy to use interface.
3) Simple and easy to build new expos.
4) The system should operate for one working day (8 hours).
   We determined the system was required to complete the following tasks:
1) Display attraction information in the form of Hyper Text Markup Language (HTML) pages relevant to the user's position.
2) Display the user's position graphically on the tour map based on their position from a GPS.
3) Limited screen size requires the user interface to be simple yet effective.
4) Provide functionality for other tours to be created and uploaded onto the system and used.

Background

There have been a number of research efforts into GPS-based hand held tourist applications, and we provide an overview of two of these systems. To achieve the aims of the project we leverage a number of areas currently being investigated by others, context sensitive computing and mobile computing.

As the Tourist Guide is an outdoor application, design issues concerning lighting and ambient street sounds had to be taken into account. Various colours and font representations were informally tested until we and other users were satisfied with the layout and the application's representation in outdoor conditions. By its very nature the system must be sufficiently portable to enable it to be carried and used for extended periods of time. Since the system is designed primarily for use outdoors, the interface must be visible under a range of lighting conditions and viewing angles.

II.   DESIGN

As the Tourist Guide is an outdoor application, design issues concerning lighting and ambient street sounds had to be taken into account. Various colours and font representations were informally tested until we and other users were satisfied with the layout and the application's representation in outdoor conditions. By its very nature the system must be sufficiently portable to enable it to be carried and used for extended periods of time. Since the system is designed primarily for use outdoors, the interface must be visible under a range of lighting conditions and viewing angles.

Creating Tourist Guides

The process of creating a tourist application and uploading it onto the system was one of the most significant requirements of the system. Throughout the design we emphasised the ability to load all the navigation and tourist information externally. This allows any tourist application to be created and uploaded on additional hand held systems running the tourist application.

An attraction location is defined by four GPS coordinates that define a polygon around the attraction. To define the polygon, the user walks to the attraction and stands at point 1 of the defining polygon. Once at the point, the user selects the Point 1 button. The user then repeats this process for all 4 points. Figure 5 depicts an example set of points defining an attraction area of interest. Select the next attraction button, the fields will be reset and the user will be able to start on the next attraction. To finish up and save the file select the Finish button.
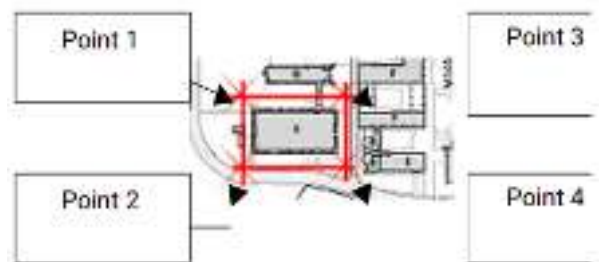
III.   GPS VS DGPS

We investigated the accuracy of the GPS with and without differential correction. The manufacturer's specification for Garmin GPS 12XL stated it has the ability to track a user within a range of 15 metres on average. We found from our investigation that accuracy is much better. In fact we have found that the range is as little as a radius of ~3.5 meters on average and still closer with the use of a differential system, up to as little as a radius of ~1.5 meters on average
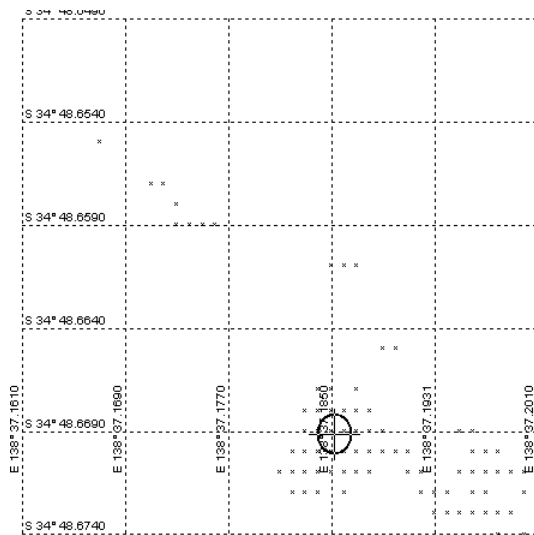
	Long	*Lat*	*Elev*
GPS	*3.18 m*	*4.23 m*	*16.73 m*
DGPS	*1.82 m*	*1.64 m*	*3.93 m*
Difference	*1.36 m*	*2.59 m*	*12.80 m*
Percentage	*43%*	*32 %*	*77%*

IV.   CONCLUSION

We have designed and implemented a Tourist Guide system that is mobile and also context sensitive. Our system was designed around the user's current location by using the standard GPS infrastructure. A suitably simple but elegant software design produced a powerful but easy to maintain location based travel expo

We have also researched the strengths and weaknesses of both GPS and DGPS and have found that for our system the accuracy of GPS is sufficient for the needs of our Tourist Guide system. Even though DGPS is 50% more accurate than the standard GPS, DGPS is not required for this type of project

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AI based ChatBot for providing Medical Information

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Abstract— **Medical System has been a life saver for countless people but there are still people unwilling to visit a doctor sometimes while being ill. The reason for this is that around most of the cases found while visiting a doctor are some minor one's which can be treated at home itself or people couldn't afford time or money to invest in visiting one. And in that case a portable system is needed which would help patients on such diseases at a lower cost rate.**

Keywords–ChatBot, Medical Information, Machine Learning, Natural Language Processing

I. INTRODUCTION

Chat Bots have become part of many industries and sectors alternative to customer service, where a client can gain basic information using the companies chatbot.The purpose of the Chatbot is to imitate humans and extract proper information from clients, from which an output can be presented to the client. The output is also a piece of information which the client desires. These chatbots can be based on different machine learning algorithms, and each one can be different from the other. The choice of algorithm in such systems are very important and thus, different chatbots can be based on different algorithms depending on the type of data used in the system.

Chatbots are only as smart and perspicacious as the inputs they have or the amount of proper knowledge they have access to. In order to make a ChatBot act more human-like it is required to analyze according to which Machine Learning Model the ChatBot is providing proper responses. As such, a good response generating mechanism is also important in a ChatBot

Similarly, these chatbots can also be used to provide medical information, with the use of correct data and algorithms. Consequently, many different approaches can be taken to implement this system.

Not only is the cost of the medical system high, but it can also be time consuming, which attributes to low visits to doctors. For such a low cost system, which can be available almost anywhere would be beneficial. A text to text conversation using chatbot, can give the user a sense of human presence available and the chatbot can extract important keywords which it could use to give an output to the user. A proper user authentication will also be required, and mapping of the disease based on user inputs will be done using Machine Learning Algorithms.

II. PROBLEM STATEMENT

To create an auto generated system to overcome certain problems of the health care system and provide a quick, and easy to available solution to the users with the help of ChatBots. This system is to bridge the gap between users and the health care system to provide fast and affordable medical solutions. The ChatBot to be used as a medium between user and the database.A system to store the user's interaction and described symptoms which can be used for later medical related issues as well.

III. ANALYSIS OF EXISTING SYSTEM

There are several researches done based on the system, each taking on a completely different approach from the other.

[1]fuzzy approach has been taken for disease prediction. This technique yields a good result, as it is accurate in predicting diseases of a person based on their explained symptoms. But this method involves scanning of the entire database for each iteration, which is not an efficient way. Especially, for the first iteration where the data is quite large to be scanned.

A [2]NLTK based ChatBot system for Medical Treatment is a system which makes use of Natural Language Tool Kit to detect and generate language. It is a python based system. And Python does have a huge set of libraries for implementing machine learning algorithms. NLTK used for Natural Language Processing can ease the task of creating a separate ChatBot. But the system is heavily dependent on NLTK, thus detection of certain medical related keywords can become difficult.

A [3]mobile application system, where NLP agent and agent for dialog management are kept in a single environment while there is a separate system for question answering system. The system has a good user interface of how a Medical ChatBot should be. Even though there is a separate dialogue management system, the system fails to generate user emphasised language.

Through a use of [4]string searching algorithm where a substring representing the symptom is identified in Natural Language Text input to extract the keywords based on which the system is to give a possible disease information as an output.

[5]Generative Models have been used to develop interactive ChatBots, and retrieval based models to gather data from the ChatBot's Conversation with the user. To interpret the user's words. But the Classification model used does not produce as good a result as other methods.

The [6]system focuses on eliminating noise from the data to extract keywords and detect medical terminologies or

important user inputted keywords. A good focus on pre processing of the data appropriately which is a must for any Machine Learning Model.

IV. PROPOSED SYSTEM

AI based techniques using data structures to be used to map the diseases the user may be facing.

Naïve String Matching

This pattern matching algorithm is to map the user input to the dataset. This method is beneficial to match the first found pattern but is not well optimized enough to match the second pattern. But when observing our dataset it is seen that only one match is needed, therefore other matching techniques may increase unnecessary complexity.

Porter Stemming

This algorithm will be used morphological and in flexional endings from words in English. This technique would allow converting words into their base form and is very efficient for English words.

Apriori

This is an Association Rule Learning Method, which will help to provide the user with a list of choices of some other symptoms the user might be facing, and is unable to explain properly. Another Association Rule Learning Method is Eclat, but since Apriori works on both confidence and lift, Apriori is seemed to be the better choice for the system.
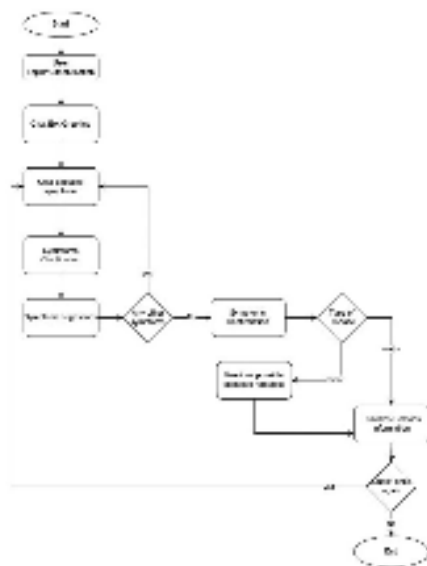

Figure. 1

The ChatBot is to greet the user before asking about the health problem, similar to a human doctor. The user has to then explain their symptoms to the ChatBot from which the system will extract important keywords. Based on the keywords, the system would too suggest some basic symptoms generally associated with the symptoms that the user might be facing.

Symptom Clarification would also be a part to make sure that the system takes only the important keywords which would help to identify the diseases. Later, the system needs to confirm the symptoms from the user. If the symptoms are cleared then the system would try to identify the disease along with some home remedies from the database, while also suggesting a doctor with the expertise of the disease the user might be facing. If the user decides that the system is not considering proper symptoms during the symptoms clarification then the ChatBot will ask the user to input the symptoms again.

Even after an output is generated the user may decide whether there is a requirement of adding some more symptoms.

The system will also ask for feedback based on the output provided to the user, to keep a measure of its accuracy and store the user's symptoms so that the data can be used for future reference as well.

V. IMPLEMENTATION

The system is to be in a form of mobile app built using flutter and DART language. This enables us to deploy the app for both Android and iOS devices through Play Store and App Store. But the algorithms and processing would be done in Python. The two languages can be made to be used together using starflut, a DART library which enables the transfer of data between the two said languages.

VI. CONCLUSION

The system is a text-to-text ChatBot system which the user will use to explain their symptoms, from which the user will be given an output, which would be the disease the user might possibly be facing along with some home remedies for the disease.

The system is heavily based on Machine Learning Algorithms, to classify each disease and also have a proper conversation with the user to extract necessary data to predict the disease the user might be facing.

A ChatBot can not only be used in Customer Care Services but can be made to be used for Providing Medical Information as well. And with the use of proper Machine Learning Algorithms it can be taken upto a completely new height.

A ChatBot can be user friendly and can be used by any person, capable of using a Chat System. The ChatBot provides personalized health assistance and can be implemented in the form of desktop or mobile application. The implementation of such ChatBot heavily relies on Machine Learning Algorithms.With the existence of such a system many more people will be able to connect themselves to the medical system.

VII. VII. FUTURE SCOPE

Present and future is an era of messaging apps where the people spend most of their time on messaging apps. Thus, an AI based ChatBot for providing medical information

has a wide and vast future scope. No matter how far a person is from a doctor they will be able to get themselves diagnosed using this ChatBot upto a certain level. The only requirement being that the person must have a desktop or a smartphone with proper internet connection.

The efficiency of the ChatBot can be increased by adding some more word combinations. Even voice conversation can be added in the future.

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MedEm - Medical Emergency Web Application

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Abstract—**The pandemic expedited deaths of many, not only because of COVID-19 but also because of the health care systems, having no place for other diseases to be treated. Hospitals are performing only elective surgeries, yet there are some conditions that fall into the gray zone which could become life threatening if not treated quickly. Simple but essential services have vanished. Many lack basic first aid knowledge and visit clinics for minute health related problems. People in the rural area are at a greater loss. We therefore propose MedEm with an aim to solve health related problems in this crisis for saving maximum lives, which would provide help and guidance during emergencies even when one's offline, check for symptoms and provide prescriptions even prepare routine for self-isolation at home in case of having COVID-19, The proposed system will be deployed as a mobile application using modern techniques like cell tower Technology, machine learning algorithms to gain maximum efficiency.**

Keywords: healthcare system, cell tower technology, chatbot, machine learning.

I. INTRODUCTION

Medical emergency and health advice is a very sensitive topic and is needed at the most unexpected times. India ranks

112 out of 190 countries in the healthcare field. The

privileged in our society have the means to access private healthcare facilities; the poor and marginalised often lose their lives to negligence and poor health facilities in the country. People living in rural areas are at maximum loss. Despite of being repeatedly flagged, these loopholes are seldom looked into. Thus there's a need for strengthening public healthcare system and making it more effective. The

Ambulance calling features are not quick and require manual input which tends to take more time. People lack the common knowledge on first aid and common diseases, and seek professional medical advice. They tend to get panicked seeing symptoms which might be fatal but end up being normal. Doctors are not available at all times. We need to take care of some problems ourselves. Even in this COVID -

19 pandemic many patients are just given some prescriptions after listening to the symptoms verbally. No physical test is

done. Not all apps provide all services. It is difficult to get right information from so many options. We therefore, propose a system for providing proper assistance and information about necessary first aid with additional medical facilities all the time, especially during emergencies.

II. RESEARCH METHODOLOGY

We studied few papers as a part of our research, the gathered information is as follows-

A. A Review and Assessment Framework for Mobile–Based Emergency Intervention App

The paper titled "A Review and Assessment Framework for Mobile – Based Emergency Intervention Apps " written in the year 2018 by Michal Gaziel-Yablowitz, David G. Schwartz was based on the following methodology –

The detection speed of the reporting agent.

1. Communication between first responder and aid requestor.
2. Responders obligation to help.
3. Matching response time to medical condition.

We studied that the success of the application depended on the following factors -

1. The speed of communication.
2. The ease of communication.
3. Ethics of people.
4. Availability of ambulance nearby.

There were few gaps identified –

a) First aid while medical emergency.
b) The location tracing and finding is online/ by GPS. c)
c) Some require online presence of doctors.

B. EMS: An Android Application for Emergency Patients

The paper titled "EMS: An Android Application for Emergency Patients" written in the year 2018 by Sanjay. A. Agrawal, Shrikant. B. Chavan was based on the methodology that the app used in this research would take inputs variables from the user, for example, the site of accident, type of medical emergency, the condition of patient, nearest hospital, etc. On this information, calculations are done to find out the nearest hospital best suited to deal with the emergency.

We studied that the success of the application depended on the following factors -

1. Uses Internet, GPS, GSM technologies
2. Takes a lot of manual input from user
3. Formula to calculate nearest hospital according to input variables

There were few gaps identified –

a) First aid while medical emergency
b) No offline location sharing mode
c) Manual input makes communication slower

C. Digital Medicine: An android based application for health care system

The paper titled "Digital Medicine: An android based application for health care system" written in the year 2017 by Prof. D.V. Chandran, Sayali Adarkar , Apurva Joshi, Preeti Kajbaje was based on the methodology that the app uses GPS and GSM to track location and Triggers alarm to nearby hospital/ family. After calling ambulance, Video calling with doctor to look into the case.

We studied that the success of the application totally depended on the following factors -

1. Video conference call

2. Emergency alarm

3. Online medical prescription

4. Finding nearest hospitals and medicals

5. Low cost and time saving system

6. Different levels of security measures in each module.

There were few gaps identified –

a) No offline mode for location sharing

b) Depends on doctor's availability

c) No information on first aid

D. Mobile-Based Medical Emergency Ambulance Scheduling System

The paper titled "Mobile-Based Medical Emergency Ambulance Scheduling System" written in the year 2016 by Bassey Isong, Tsholofelo Magogodi and Nosipho Dladlu was based on the methodology The app uses the Google map features to locate the patient's current location. The patient then fills the rest of the details to book an ambulance. After filling the features the ambulance admin sends the ambulance to the patient and estimates the time of arrival.

We studied that the success of the application depended on the following factors -

1. The app requires internet connection and GPS to be switched on the entire time.

2. It takes input from user.

3. The admin of ambulance allocates the ambulance.

4. The shortest time of arrival is displayed to user.

There were few gaps identified –

a) Emergency feature doesn't function during offline mode.

b) Requires manual inputs

c) Requires doctor's supervision at many times

d) No information on first aid

III. PROPOSED WORK

Methodology –

The main objective of the study was to build a healthcare emergency system, which would have all the necessary features required to assist during an emergency, all in one place. Also, considering the research gaps of the papers we studied, the system was designed to be efficient in speed and independent of internet during emergency calls. The system was designed considering the worst-case scenarios during medical emergencies. The major features of the system hence designed were: Emergency button, Offline Location Sharing, Broadcast of the distress message and Intersection Meeting point.

Along with the emergency system, we added features to aid in healthcare of people at all times. An AI based chatbot designed to communicate with the patient as an artificial yet accurate doctor, which would guide you during first aid, check symptoms of diseases and provide with suitable remedies. The information collected while registration includes simple yet crucial details of the user, such as their "allergies". The medicine/remedies provided are not general, but contains options. The user gets to choose the type of medication they prefer for treatment, for e.g., some people prefer Homeopathic remedies. We also socialised the concept of generic medicine to spread awareness.

To implement this system, we thought of doing so through mobile application.

We will be seeing all these above-mentioned features explained properly in the section below:

1. User Registration –

The information we collect from the user is not just basics, but something that will be used at every point of the emergency. Information that should be known to people who are treating the user. This includes Allergies of the users, Pre-medical History and most importantly their Blood Group and Age. This information will be collected during the initial registration done by the user and shall be updated in a period of 15-30 days. This information shall be kept private at all times until they call for an emergency. Even after the emergency is called, only the name and age of the person shall be known in common, rest of the information shall be collected by the doctors and nurses only.

Also we are planning to include the idea proposed by our honourable Prime Minister Mr. Narendra Modi which is a Health Card that will include all the health care details and that will be must for every citizen as per the sources, so will use the card

number in our system so that the details of the

person can be fetched through the no and there will be not any need to enter data manually.

a. Profile –

This section will keep record of the user's personal information, and their medical history. This section shall be updated every 15-30 days to keep the information up to date. The medical history of the user shall be stored in calendar format. This tab would be password protected for

extra security as health problems are very private stuff. Other than that, it will have some other options, such as Know More, Help Me,

Feedback, etc. which could be filled by the user anytime.

2. Emergency System –

Emergency Button: The entire emergency system, shall be initiated after pressing this emergency button, which shall be present on the lock screen at all times. To avoid pocket pressing, there will be a small confirmation message which shall be shown to the user, in order to initiate the system, and once

confirmed, the system is initiated. The following

features are under emergency section –

a. Location Sharing –

This is the second step in the emergency system. The location from where the emergency is called gets traced. Now, since most of the regions have poor internet connectivity or GPS functionality, we have an offline method of tracing the location. This is the Cell Tower Technology. Just like a GPS uses the markings of three satellites to confirm the location of an object, the cell tower technology makes use of cell towers. Mobiles can catch the signals from a cell tower of any network, even when there is no signal. Each Cell Tower has its own unique postal code. The program identifies and then uses this postal code to determine the location of the signal. Three such cell towers are used to pinpoint the exact location. The first cell tower judges the distance of the source, and concludes a perimeter inside of which the signal source could be present. The Second Cell Tower narrows down the choice to "two" points. The Third Cell Tower pinpoints to one exact location. Using the postal codes of these cell towers and the distances of them from the signal source, we could get the exact coordinates of the signal. Now these coordinates will further help us determine the nearest available Hospital or Health Care centre where we could take the user for proper treatment.

b. Message Broadcast –

Now the details of the emergency will be encoded in form of a voice/text message and will be broadcasted all around the area to get one confirmation. This information includes the Location of the emergency, the age and name of the user. This message will be a recorded message, so only the details would be replaced in the original auto generated message. This broadcast continues until we get a confirmation from at least one hospital, health centre or ambulance. This broadcast will act similar to those in police vans, where the speaker tells a location and details of crime, and one of the

officers nearby to that area answers "I COPY!". This is the third step of the emergency. Once the message is passed, only two things are to be done: Transport and First Aid.

c. Intersection Meeting Point –

Once the location is confirmed and the ambulance has departed, all the user needs to do is wait, and if possible,

provide first aid to the victim (In worst cases, the user is the victim). Now in this meantime if the victim gets critical, first aid would be of no help. And if the distance is greater, the condition could worsen and there could be chances of the condition becoming fatal in meanwhile. So instead of waiting at the accident spot, if there is transportation available, the victim could be carried halfway to the health centre. i.e. instead of waiting for the ambulance, we could reduce the waiting as well as the distance by taking the victim to some common intersection point, where they could be shifted to an ambulance. This will be done using the GPS system, which will show the ambulance Driver and the victim's helper a common point, where they have to arrive. The code implemented will use the roadmap and traffic condition to interpret the meeting/ intersection point for the safe travel of the victim. This concludes our steps for Emergency system.

Now once the victim is taken into an ambulance and carried to the hospital, his details are checked. These details include his name, medical history, his emergency contacts, address and everything else. So, while the patient is being treated, their family and other people are contacted.

Since this system doesn't require the internet connections at all times and could be used by the victim as well, it becomes very helpful for people who are travelling, trekkers, people travelling in trains, etc.

3. Healthcare System –

These are the features displayed in the mobile application -

a. AI Chatbot Assistant (Dr BOT) –

Your personal healthcare assistant. Dr BOT is an AI based Chatbot which shall answer all your questions or queries for any particular problem. To make its use more effective, we will develop this Chatbot with Voice to Text and Text to Voice conversion. In cases of emergency you and Dr BOT will be able to communicate verbally. This AI Chatbot will

answer the questions according to the type of service asked. Once you open the App, there will be 4 Tabs in front of you, namely: First Aid, Symptoms Checker/ Treatment Required/ Hospitals Nearby, your Personal Routines/ Reminders and Profile.

So, each section of the Chatbot shall identify different intents (An intent is an action or a request the user wants to perform or information he wants to get.). This will make the data more organised and chances of error becomes less. The Data also gets managed accordingly.

b. First Aid –

This section will take care of the First Aid part of the application. First aid is very crucial and very less people have the knowledge about it. The intents over shall be like: "CPR", "Heart Attack", "Burns", etc. Since this is first aid, most of the people shall give these intents with some entities in form of voice messages, and the Chatbot shall give responses in form of steps. For Example:

User: "Hey Dr BOT. What do I do for a burn?"

Dr BOT: "Keep the Burnt region under ice cold water."

Dr BOT: "Gently Dr..y the burnt area and apply some lotion."

Dr BOT: "Be gentle and try not to remove any skin."

In some cases, the Chatbot shall give pictorial responses as well. Or, it may ask for some picture inputs. For e.g., to know the degree of burn, we shall need to click the picture of the burnt part as input. Also, the Chatbot is personalised. So, it shall contain some info about the allergies and medical history of the user as well. So, it may use this information wherever it may need it. This will help people in daily life as well as Emergencies.

c. Symptoms Checker/ Treatment Required/ Hospitals Nearby -

This section will take in intents in the form of symptoms. They can be like: "High fever", "Red eyes", "Sour Throat", etc. These symptoms shall be given as input step by step. After 2-3 steps, the Chatbot shall start asking for symptoms from its side. This happens because some symptoms are not visible physically. For e.g., chest pain, stomach pain, back pain. Sometimes we miss to add such symptoms and we do not get the desired diagnosis. Hence, the Chatbot keeps filtering the list of diseases according to the first 3 or 4 symptoms, which are visible. After filtering it gets into hand a list of 10 or less diseases. Now these diseases may have some features we may not be able to describe. So, the Chatbot uses natural language, and starts asking the user whether these symptoms are present or not. On matching of symptoms, the Chatbot would respond "Yes", and if the symptom is not matching, the response would be "No". Likewise, the Chatbot will keep on asking questions, until one or two final diagnosis are available as results.

Once the diagnosis is complete, the Chatbot would start asking for the type of treatment the patient is expecting. There are 2 main types of treatments: Medicinal and Home Remedies. The Chatbot will be giving the Home Remedies without asking. For e.g., "Take Hot Steam for Fever!". For medicine, the Chatbot shall give you four choices: Ayurvedic, Allopathic, Homeopathic and Generic Medicine. Now people shall not be knowing much about generic medicine, so the chatbot would provide this as an add on to allopathic medicine. (Generic medicines are nothing but allopathic medicine developed at cheaper costs). So, the patient would choose their desired medication and they would get the list of medicine/s they will be needing to take in order to get well.

Now sometimes we might not be able to get a proper diagnosis. Or sometimes the diagnosis will ask you to do some tests in order to confirm the disease. And sometimes the disease/injury might need to be seen by a professional. In such cases the Chatbot won't suggest anything from its side. Rather, it shall ask you take a professional opinion, i.e., meet a doctor. It would then show you nearby health care centres and hospitals which we could visit in order to get ourselves checked. This is to ensure that we make no mistake to provide the people with the best treatment they deserve. After suggesting the hospital, the chatbot will give the number for appointment. Once we return from the appointment, the Chatbot shall ask for the report. This is to update the data in our database and keep a check on our user's health. This is another function of the app.

4. Personal Routines/ Reminders -

Our services do not stop after the prescription. This tab will store the reminders for the users: What time they should take medicine, what time they should have lunch/breakfast/dinner, what time they should exercise (physiotherapy), what time they should Drink water, etc. All reminders will be set manually according to the prescription you have been provided. After the prescription is given in the treatment required tab, the user shall be redirected to this tab to add that prescription in form of reminders. The reminders will end after the end date of the prescription passes.

IV. CONCLUSION

Medical health and Eemergencies are two of the healthcare fields that requires cutting edge technologies to provide an effective and equally available immediate services for anybody who needs it. The results of the project will show the possibility of saving the lives. The emergency button and conversational interface seems to be a viable solution capable of handling the situations for a time being until the help arrives thus reducing the chances of death-that's already a giant step forward.

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Hyper Spectral Image Processing Using Deep Neural Networks

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Abstract--**In this paper, we derive a deep neural network architecture that describes the content of images and retrieves them based on the generated descriptions. This way we simulate a simple conversation about images. We propose an application whose main objective is information exchange in form of successful image retrieval. While doing this we impose the constraint that produced image descriptions should be as similar to human generated language as possible.**

Keywords--Machine Learning, Image Captioning, Hyperspectral, Deep Neural Networks

I. INTRODUCTION

Here, hyperspectral image captioning collects and processes information using electromagnetic spectrum. The main objective is to fetch each pixel in the image, with the idea of matching different real-life objects. Human eyes can perceive the color of visible light in three bands. But in hyper spectral image processing the recorded spectra have five wavelength resolutions and covers a wide range of wavelengths. So, this helps in further detailed and enhanced understanding of image. We are proposing a portal (web application) consisting of various Machine learning/AI techniques and different algorithms of deep neural networks. Where any satellite image or any image can be uploaded and actual captioning of the objects and every minute detail will be done with enhanced description and machine interpreting the situation as close and likely as humans could. Thus this would not only be boon for defense sectors, rescue operations, medical requirements but would also help to eradicate unforced human error and to get actual information and idea of ground situation and accordingly necessary measures can be taken.

II. BACKGROUND

We encounter a large number of images everyday through internet, social media, newspapers, posters, articles etc. Humans can interpret most of them, but automatic image captioning can make this task easier. Image captioning has been a popular topic among the people exploring machine learning. While machines need algorithms to process images, humans can do it naturally. However, image captioning remains challenging from a computer vision point of view. Some images can only be deciphered using common sense knowledge and the software may or may not caption it the way we want it to, since learning based image captioning is a data- driven task which relies on training dataset. Hyperspectral image captioning is the captioning of these images on a wider spectrum. Hyperspectral image captioning even though being studied a lot, have been implemented by only a handful of people even though it is needed in almost every field of life.

III. RELATED WORK

3.1. Existing System:

Though image captioning is in picture since long time its research and enhancements in technology have taken place quite quick in recent times. Using image captioning algorithms and various techniques there are successful results in different fields like calculating yield of good quality crop, skin vision techniques; Picasa app also uses these algorithms. But more promising and relevant work can be carried on by adopting hyper spectral image processing techniques in sectors like defense (where drone or satellite images can be in depth be understood by machines intelligence and proper measures can be taken), for rescue operations(where exact ground situation of depth of water level in flooded area, people stuck and surroundings could be known) so this can have quick and effective operations held in place with great results. So adopting different new algorithm techniques based on hyper spectral image processing there can be indeed great enhancements in existing image captioning system with more accuracy and more real (ground level) information benefitting humans.

3.2. Literature Survey:

3.3. Problem Statement:

In this paper, a web application is proposed, using which the images captured will be captioned (i.e. described) with the use of deep neural networks and trained datasets. Images captured from far away such as from drones or even satellites can be uploaded on this website and captioned with great precision

3.4. Survey

We conducted a survey consisting of different questions and different sections of people and different age group of

people attempted it. Where in our main aim was to ask people about their understanding and awareness about hyper spectral image captioning. And according to them measures taken by government organization in different situations were up to the mark or not. And in which sections and areas could this fabulous technique can be applied and how relevant it could prove to be in certain sections making the task easier and effective.

The different questions asked in the survey were:

1) Do you think government agencies were not able to take effective steps in rescue operations in flood affected areas?

2) Sectors you think hyperspectral image processing can be implemented?
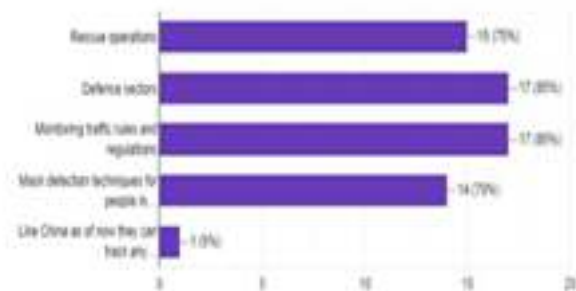
3) Do you think hyperspectral image captioning can be useful in near future?

4) Where else do you think we can apply image captioning so as to benefit people?

So looking at the survey we understood that many of the people think that government measures could have been more effective. People also suggested different areas where this hyper spectral image processing can be used in different sections and helping that sector grow immensely. Majority of people agreed that this technique can be a boon and can be adapted in various sectors with tremendous applications.

3.5. Proposed Work

The main objective will be to build a web application using HTML, CSS and JavaScript in which the user uploads images and with the help of traineddatasets the images will be captioned and the given caption or description of the image will be displayed as an output on the website. Deep Neural Networks such as Feed Forward Neural Networks (FFNN), Recurrent Neural Networks (RNN) and Convolutional Neural Networks (CNN) will be used for image classification and image detection. We will use the CNN-LSTM architecture which is specially designed for feature extraction in inputs such as images and videos.
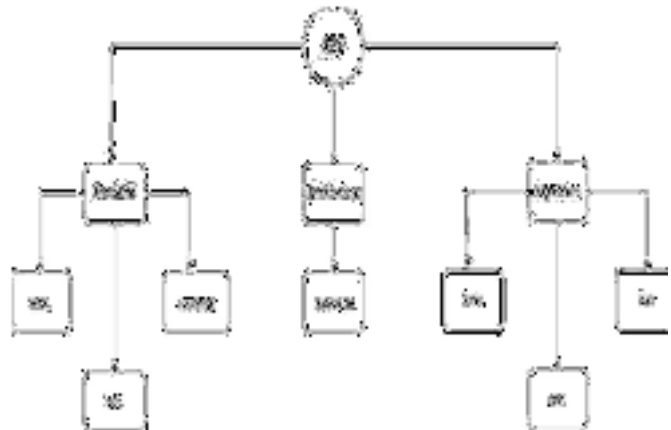
IV. IMPLEMENTATION AND RESULTS

4.1 Datasets:

After the creation of the web application front-end, some of the pretrained datasets will be used for training, testing and the evaluation of the image captioning methods. The datasets differ in various metrics such as the number of images, the number of captions per images, formats of captions, image sizes etc. There have been several such datasets proposed in the literature for benchmarking algorithms for semantic segmentation of hyperspectral image captioning. Some of these datasets are the MSCOCO dataset, TorontoCity dataset, the ISPRS 2D semantic labelling dataset, the Mnih dataset, the SpaceNet dataset, etc. The most popular among these is the MSCOCO dataset.

The Microsoft Common Objects in Context (MSCOCO) dataset is a very large dataset for image recognition, segmentation and captioning. There are various features of MSCOCO dataset such as object segmentation, recognition in context, multiple objects per class, more than 300 thousand images, more than 2 million instances, 80 object categories, and 5 captions per image. Many image captioning methods use MSCOCO dataset in their method.

4.2 Results and Discussion (flowchart,data Design): This portal consisting of different machine learning

algorithms and techniques will be made equipped

with Chabot too. Which would help

people to understand the details of image deeply according to their native language or language of preference. In the portal tensorflow technique will be primarily used and recurrent neural networks(RNN) and Long short term memory(LSTM) the more special kind of RNN will also come into picture for more effectiveness. And the User Interface which is the most important part there Keras will come into picture and which uses Theano or Tensorflow for its backend. It runs smoothly on both CPU and GPU. Keras supports almost all the models of a neural network – fully connected, convolutional, pooling, recurrent, embedding, etc. Furthermore, these models can be combined to build more complex models.

Thus making this portal more reliable and effective

V. CONCLUSION

Image captioning has made significant advances in recent years. Recent work based on deep learning techniques has resulted in a breakthrough in the accuracy of image captioning. The text description of the image can improve the content-based image retrieval efficiency, the expanding application scope of visual understanding in the fields of medicine, security, military and other fields, which has a broad application prospect. In this paper, we have tried to implement hyperspectral image captioning using deep neural networks with the help of new techniques such as CNN and RNN which will be helpful in Automatic image indexing, CBIR, biomedicine, commerce, military, education, digital libraries, web searching etc.

VI. FUTURE SCOPE

The future scope of the portal :

1) Keeping it updated with new and modern techniques of machine learning and improving is ability to catch and present the information correctly and with more precision

2) Making it more easy to use and trying to get more and more people aware about the hyper spectral image processing techniques and its effectiveness.

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ML-based Approaches to Automated Product Tagging for Apparel: A Review

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Abstract - **With the advent of digitization and a subsequent shift to online shopping, there has been a sharp increase in both e-commerce vendors and consumers. Most consumers will conduct a text-based search to find what they are looking for. Interestingly, said textual query is generally about a visual feature. While the user may see a variety of products in their search results, many products matching that visual description do not make it to users' notice because they're not appropriately tagged. Product tags are important keywords associated with each product. Not only tagging is important, but it should also be homogenous. Several approaches to automate the task of tagging have been implemented in the past, but not without their setbacks. This task's efficiency is significantly dictated by the quality of data and attributes tested for. The use of transfer learning has also been favorably seen in many of the discussed approaches. A comparative study of some of the significant work in this field will help identify the lacuna and attempt to overcome the same.**

Keywords: e-commerce, visual feature, product tags, automate, transfer learning, comparative study

I. INTRODUCTION

Covid-19 has spurred digital transformation, resulting in a boom in the internet economy. Going digital will determine the success or failure of many enterprises. This is also true in the fashion sector. Every day, new products may arrive, waiting to be managed and prepared for sale. All of these products must be scanned and exhibited in the online catalog after arriving in the warehouse. The digitization process necessitates the collection of a large amount of data on the product, which takes time.

This task is made much more time-consuming by an unstructured catalog. Inaccurate catalog data leads to inaccuracy in search results. Searching is often the first thing visitors do on a website. Customers must be able to readily find what they're seeking to have a pleasant experience. All products must be properly tagged. Traditional methods of assessing and categorizing a product image take a long time and are quite tiring.

Automatic product tagging aims to replace manual tagging. It uses Deep Learning to eliminate the need for human participation. It works by scanning an image and detecting traits linked to specific keywords. To determine if a fashion item is in an image, computer vision-based algorithms learn from a large number of photos about how garments look and what features describe them. A trained system that has viewed thousands of carefully annotated photographs can tag clothes with numerous categories and features. One such example has been shown in fig. 1.

Fig. 1. Example of auto-generated tags

We aim to explore numerous such systems in this paper and learn from the same to incorporate the takeaways into our system. Section II contains the main part of our work, which is the literature review. Section III captures the methodology adopted. Section IV captures the results in a tabular format and highlights our takeaways.

II. LITERATURE SURVEY

Gutierrez P. et al. [1]: The objective of this paper is to predict 9 fashion attributes in 4 different categories: apparel (dresses and tops), shoes, watches, and luggage.

The algorithm and techniques used by the researchers include 9 Deep Learning (CNN) classifiers, training using ResNet, GoogleNet (ImageNet: for transfer learning), Alexnet architectures, Python library for dataset compression, PT (product-type) classifiers before attribute prediction to reject outliers, network regularization, visualization using the t-SNE algorithm.

Given an input image, it first classifies it into one of the 4 categories using PT binary classifiers. Then, attribute prediction (or tag generation) is carried out. In all, 9 attributes are considered during classification. Every attribute prediction could result in one of many classes.

The merits of this system are noteworthy. It first detects the type/category of product out of apparel, shoes, watches, or luggage. Based on the above result, the input is tested only for attributes characteristic to that category. Eg.

Luggage will be tested for shell-type but not for sleeve length. It is robust and evaluates to an accuracy of approximately 90%.

Katiyar A. et al. [2]: The objective of this paper is to auto-tag images uploaded by the vendor based on features and also cluster them into different domains based on the tags.

Numerous algorithms and techniques were utilized for this system. After the generation of tags for an image

(single/multiple tags), it uses prediction algorithms for classifying the image into a domain. This is necessary since there can't be a definitive logic to classify images with multiple tags. Prediction needs to be used. (Here, prediction means a computed guess, what ML helps us achieve. The task at hand is actually multi-class classification). Pre-trained model VGG-16 was also used to extract features. This is known as transfer learning. Further, a 2-layer network is applied to generate tags. The 5 tags with the highest confidence are chosen. Grouping according to similar tags and application of NMF also take place. Images & tags are fed to the t-SNE 2D algorithm to reduce the dimensions and cluster them into domains.

To discuss a few merits of the above-mentioned system, it was trained on a publically available dataset and with an appreciable accuracy of 76-82%. Both tasks, that of automatic-tagging and clustering into domains were carried out. It is a very useful system for inventory management.

Sharma, V. et al. [3]: This paper aims to make an automatic tag-assignment system for various e-commerce products, solely based on visual features (Image to Tags), and also to make a tag-based product retrieval system using allotted tags (Tag to Images).

Algorithms and techniques used by the authors include feature vector extraction using deep CNN and VGG-19 (Transfer learning), inverse distance KNN classifier (weighted) among other multi-label classifiers to assign tags, and a hash table of tagged images created with the tag as the key. For each tag, the corresponding images were stored in order of the 'presence score' of the tag in the image. Images would be returned in that order upon being queried.

Three advantages were identified for this system. It can identify tags for multiple categories of products besides apparel. It provides us with 2 applications: tag generation and product retrieval. It is scalable as it chooses to avoid one-vs-all classifiers like SVM and is efficient.

Venkatesh N. Murthy et al. [4]: The objective of this paper is to build image annotation models based on Canonical Correlation Analysis (CCA) that aid in modeling both visual features (CNN feature) and textual features (word embeddings).

Numerous techniques and algorithms have been applied to this system. Note that it extracts both visual and textual features. It returns a fixed number of tags. CNN features are extracted using a pre-trained VGG-16 model (Transfer learning). Textual features are extracted using word2vec (pre-trained). All images are resized to 224 x 224 to make them compatible with the CNN.

To mention some of the merits of the system in question, it claims to be the first of its kind to be applied to the 3 standard datasets. It also justified the use of CNN features instead of multiple handcrafted features. Word embeddings were used instead of binary vectors.

Lao, B. et al. [5]: This paper aims to carry out a multiclass classification of clothing type (eg. type: T-shirt), clothing attribute classification (eg. color: grey), clothing retrieval

of nearest neighbors (similar apparel), and clothing object detection (identifying regions in an image containing clothing objects).

To discuss briefly the algorithms and techniques applied, CNN and Region-CNN (R-CNN) were used. Application of binary vectors to identify clothing attributes was seen. Similar apparel was identified using the K-nearest neighbors (KNN) algorithm. The system also converted superpixel-labeled images to bounding-box labeled using edges of superpixel-labeling. This was done to make the clothing object detection dataset compatible with R-CNN. Selective Search was applied to increase the number of training patches. Transfer learning was leveraged in this system as well with the help of AlexNet.

Some features of this system set it favorably apart from other systems. It specifically deals with apparel annotation and also explores the applications of the same. It incorporates 4 tasks into one system with appreciable accuracy. The 4 tasks are multi-class classification of clothing type, attributes, retrieval of similar items, and object detection.

Wei Di et al. [6]: The objective of this paper is to carry out recognition and retrieval of fine-grained clothing types and styles.

Let's note the algorithms and techniques used by the authors. The team harvested coat/jacket images from online e-commerce sites, including eBay, and annotated them to create the dataset. Images with a strictly clean background were chosen and ones including models were filtered out. Attribute-level image annotations were obtained using Amazon Mechanical Turk. Publically available classification framework VLFeat was utilized. Binary SVMs were applied for each attribute. It focuses on a single category: Women's Coats and Jackets.

The system has several advantages to mention. The input query for clothing retrieval can be image-based or text-based or multimodal (image with text). This team of researchers built the first of its kind dataset for fine-grained clothing style recognition on standard product images. It also throws light on attribute cooccurrence (eg. Attributes leather and zip fastener are more likely to co-occur than leather and button fastener)

Mason, R. et al. [7]: The objective of this paper is to learn a model of visual and textual features using a collection of images and corresponding captions i.e the model learns to predict the visual features (tags) of an input image based on the image-caption pairs in the training data. While testing, the query image won't have a caption.

Algorithms and approaches adopted include interpretation as a generative polylingual topic model. The captions in the dataset had to be cleaned to remove code snippets and URLs that accidentally made it into the repository. The Bag-of-words model was utilized for text features and Mxterminator for sentence splitting. Stanford POS tagger was used to tag words besides stopword removal and conversion to lowercase letters. The Bag-of-features model was applied for visual features and the VLFeat library was used to calculate SIFT features. These features were clustered using K-means to recognize the shape.

RGB and HSV representations are used for color and then the sampled pixel values are clustered using K-means. Further, Gabor filters were applied on images to gather texton features for texture. The Bag-of-HOG model and K-means algorithm helped evaluate gradient and curvature. The image file size was fixed at 280 x 280 and the images were clicked from a mostly fixed angle, against a white or light background.

Merits of the system included overall efficiency and inclusion. This is because the execution of the system was carried out with exceptional accuracy and without any modification or tuning of parameters. It took into account learnings from both the image (visual features) and the caption (textual features).

Karim M. Ibrahim et al. [8]: The objective of this paper is to address the problem of Multi-label Classification with Missing Labels (MLML) by introducing a weighted loss function to account for the confidence in each label/sample pair. This can be used to fine-tune a pre-trained model on an incomplete data set.

Several algorithms and techniques drive this system. One of them is the application of confidence-based weight per sample for each of the positive and negative labels independently. Also, less weight is given to samples with low confidence in their label. Besides this, the system modifies terms in the binary cross-entropy loss to add said weighting factors. The estimation of weights is done using labels correlation (CB-WCE: Correlation-based weighted cross-entropy). Transfer learning is applied using pre-trained model inception-resnet v2.

To discuss a few advantages of the system, it is scalable and usable to fine-tune a pre-trained model. It is the first approach of its kind. It establishes that 'CB-WCE' is more useful than 'IM-WCE' when computing the weights (IM-WCE: Ignore Missing WCE).

Fangxiang Feng et al. [9]: The objective of this paper is to use the n-grams extracted from the product title as its label to construct a dataset for image classification. This information from the title is utilized to learn features.

Let's understand the algorithms and approaches adopted by this system. The constructed dataset is used to fine-tune a pre-trained model (ResNet-50). The MAC (Max-pooling activation of convolutions) feature is extracted from the fine-tuned model. Features are extracted from the query image and then, based on the cosine similarity of features, similar images are retrieved. Bag-of-n-grams (3<n<5) is used to not only obtain discrete labels from sentence-like captions but also to ensure that the labels are a phrase and not a single word. This prevents unnecessary overlap of categories. The CountVectorizer class in scikit-learn has been used to vectorize the titles. The BiT toolkit by Google has been used for retraining.

Some notable merits of the system include the fact that the system works without any human annotations, pre-processing, or post-processing tricks. Despite the target dataset having no labels, it was successfully used to fine-tune the pre-trained model. This was possible because labels were realized using product titles.

III. METHODOLOGY

The methodology described in fig. 2 was used to conduct this review. It is a method for detecting, assessing, and understanding research results that have been conducted and are relevant to the target field. There are three components to the process as shown.
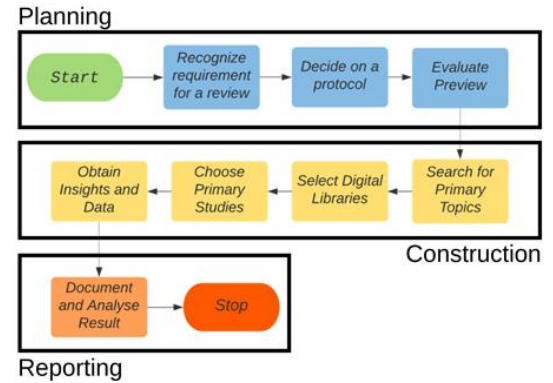
Fig. 2. Systematic Literature Review

A need for review was identified since existing approaches were crucial to consider before proposing a system. The establishment of a protocol helps maintain consistency across reviewers and makes the work easier to refer to.

Next, we have to identify our search string i.e the primary topic we will be researching. We can then select a handful of reputed digital libraries to explore. After this, it is important to filter the results based on abstracts, keywords, focus area, year of publication, etc. This resultant repository can then be scrutinized and reviewed to obtain valuable insights and data. Mannerly and systematic

Sr. No	Demerits
Gutierrez P. et al. [1]	1. Small perturbations to the pixels during resizing can significantly affect the classifier's predictions 2. Simple thresholding of confidence values is not enough to reject outliers. Hence PT classifier & regularization were applied.
Katiyar A. et al. [2]	1. Model might not be robust due to the kind of dataset used 2. A limited number of attributes/tags can be predicted with high accuracy.
Sharma, V. et al. [3]	It is a generic system for various e-commerce products. For the given products of the same category, it may not be able to identify finer differences; often most important in the fashion industry. For eg, the system could tell a t-shirt apart from a shirt, but it won't be able to tell a winter shirt and summer shirt apart.
Venkatesh N. Murthy et al. [4]	1. Can generate only a fixed number of tags (five) 2. It is not specific to the domain of apparel and may not perform well to generate tags specific to apparel.
Lao, B. et al. [5]	Clothing type and attributes can be classified for the upper body only due to the limitations of the dataset.
Wei Di et al. [6]	1. Long and costly process due to human annotations and focuses only on a single category 2. Poor classification results for attribute denim \ 3. Doesn't use transfer learning. (Could have improved generalizability)

Mason, R. et al. [7]	1. Due to the dataset used, the system concentrates only on women's bags and shoes.
	2. Due to noise in captions and other inconsistencies like the use of synonyms and mis-spellings, learning visual features from the captions is not very promising.
	3. No predefined list of attributes that the model is supposed to learn
	No negative examples to train the visual classifiers
Karim M. Ibrahim et al. [8]	The system requires a strongly labeled multi-label dataset with no missing labels at the start
Fangxiang Feng et al. [9]	1. The tags/labels that the model can classify query images into are severely restricted and defined by the vendor's style of giving titles to the product
	Not suitable for fine-grained image classification

documentation of the same is a must for any review to be useful and productive.

IV. RESULTS AND DISCUSSION

Table 1 captures the setbacks of each body of work concisely reviewed by us. The purpose of enlisting demerits like this is only to identify the scope for improvement, learn, and attempt to overcome the setback. A plethora of insights and learnings were obtained from the work reviewed.

Table 1. Demerits

Lack of diverse data, heterogeneity in manual tagging, noisy images, and captions are some of the broad setbacks that need to be overcome in our pursuit of building an efficient system to automate product tagging.

Fig. 3. Overview of Techniques

Fig. 3. briefly encapsulates the various techniques and algorithms we came across while conducting this review. Transfer learning and CNN classifiers were common in many systems we studied. Computer vision is undisputedly effective in the required object detection methods [10]. Most systems adopted some kind of binary classifier for determining the attributes. Resizing was also seen as a common step in preprocessing while t-SNE appeared to be a standard for visualization.

V. CONCLUSION AND FUTURE WORK

Although a larger market size has created greater chances for sales growth, the online fashion business still lacks the tactics to target consumers with accuracy. Because the procedure is not yet automated or digitalized, most of the process is still done manually. Featured goods on the main pages of e-commerce websites are usually merchandisers' picks or a list of the most profitable things.

Automated tagging is a step to optimize the process for both consumers and vendors. Many successful experiments exist covering various algorithms but most do not get the opportunity to train on a rich dataset. Transfer learning emerges as an efficient stepping stone in this field. The major algorithms adopted, key features, merits, and demerits have been realized in this review and we can now further learn about the promising algorithms, their efficiency, and implementation.

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A Comparative Analysis of ML Algorithms in Downlink Throughput Prediction of IEEE 802.11ad WLAN through 6G enabled mobile device at 60 GHz

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Abstract - **In the recent past, machine learning (ML) techniques have been widely incorporated to provide effective solutions to issues related to complex wireless communication networks. Learning based prediction methods are highly preferred for simultaneous operation of Wi-Fi with cellular technologies. To meet the high expectations in the quality of experience (QoE) that is associated with virtual and augmented reality, HD video streaming at extremely high resolutions etc., 60GHz unlicensed spectrum is explored in 802.11ad IEEE standards. Predicting throughput at high frequencies is a challenging research problem due to its wide variations caused by agility and obstacles. In this paper we apply various ML techniques to predict the downlink data rate of an 802.11ad WLAN network to download data to a co-existing cellular device. We analyse the performance accuracy of regression based ML algorithms namely Linear, Ada-Boost, Random Forest and Gradient Boosting. We use an existing data set measured in 60GHz environment with varying mobility patterns and mobile orientations and determine the best suitable throughput prediction ML algorithm. Furthermore, we identify the vital network attributes that contribute effectively to the prediction process. Simulation results highlight Gradient Boosting regression technique as the most efficient throughput prediction algorithm with highest R2 _score of 0.8432, and least prediction errors.**
Index Terms - Machine Learning, Unlicensed spectrum, WLAN, regression.

I. INTRODUCTION

The emerging trends in the mobile technology have paved the way for bandwidth hungry applications like live video streaming, virtual reality etc., that are extremely sensitive to latencies. To meet the demand for rigid QoE requirements associated with these applications, the network performance needs upgradation of high system throughput and acceptable latency levels. Accordingly, the 6th Generation mobile networks are anticipated to support very high bandwidth, meagre latency and robust connectivity. This would enable immense data exchange at diverse frequencies by incorporating various technologies such as mm wave, massive MIMO, optimized radio interface, beamforming, network management etc. The operation of 6G devices in the unlicensed spectrum together with IEEE standard 802.11ad Wi-Fi is still in the nascent stage of research. Few of the related works from the literature are discussed as follows.

II. RELATED WORKS

In [1] the authors have conducted a study experiment to predict the downlink data rate of 802.11ad WLAN in downloading data to a 6G user equipment under different patterns of movement and orientation. The highly directional beams used in the mm Wave communication combined with orientation sensors is experimented to detect fast rotational movement of users and prevent link loss in the mm wave networks [2]. 30-300GHz band is designated as mm wave spectrum and 0.1 to 10THz band as terahertz spectrum. The signal in these bands is characterized by wide bandwidth, elevated directivity, increased path loss and blockage effects [3]. The high dynamics of the network system at high frequencies can be dealt with AI and ML based prediction models instead of the complex and in accurate mathematical models [4], [5]. In [6] the authors illustrated the optimization of indoor mm wave Wi-Fi network performance in terms of throughput and fairness based on LOS connectivity to stations. In [7] harmonized coexistence of co-located technologies such as LTE – Wi-Fi has been achieved by developing a CNN model for traffic prediction that can determine Wi-Fi network saturation.

III. METHODOLOGY

We analysed the downlink throughput prediction using four different regression ML algorithms on the dataset that is publicly available [8]. The dataset has been obtained from an existing work on downlink data rate measurements of 802.11ad Wi-Fi interfaced to a 6G enabled used equipment [1].

1.   We performed a reliability test on the network parameters or predictor variables and concluded that

few parameters contribute significantly to data rate prediction. The correlation matrix, VIF tests were performed to detect multi co linearity or inter-dependence among the predictor variables.

2. Finally, we compare the computational performance of the ML algorithms under consideration through latency prediction.

The four types of regression algorithms considered in this paper for performance analysis has been elaborated as follows

IV. MACHINE LEARNING ALGORITHMS FOR PREDICTION

The four machine learning algorithms which belong to varied category are considered for predicting throughput from the network parameters as follows. The basic linear regression, ensemble regression techniques based on boosting and bagging principles is utilized for throughput prediction in the proposed work and their respective performance is analysed.

A. Linear regression:

The linear regression is the simplest machine learning based regression technique which predicts the output based on its statistical relationship with the input data point presented. The model is trained to determine the line of best fit between the dependent output and independent input data point. In the proposed work, the throughput is predicted using the multiple variable linear regressions wherein the throughput is posed to be linearly dependent on the predictor parameters.

B. AdaBoost regression (Adaptive boosting):

All the data points used for prediction may or may not be linearly related. Thus the ensemble techniques such as Adaboost can be used as prediction model. Adaboost is the first boosting algorithm which uses the ensemble of multiple weak regression models to obtain a strong regression model by updating the weights accordingly. At the concrete level, the weak models are decision stumps which are grouped and the learning is improvised by changing the weights to be high for wrong predictions and lesser for correct predictions. Thus going by name, the model adaptively changes the weights based on the prediction accuracy of the current iteration. The varying weights to boost the prediction is the significance of boosting algorithms such as Adaboost regression.

C. Random Forest Regression:

Another prevalent ensemble technique is Random forest regression which, on another hand, is a fair ensemble technique. It operates on bagging principle rather than boosting wherein all the weak learners possess same weights to output predictions. Thus the final prediction is the average of the equally weighed individual predictions of the weak learners.

D. Gradient Boosting Regression:

Another vital Boosting machine learning algorithm, Gradient boosting regression concentrates on the predictions of every iteration and obtains the gradient of the error with respect to actual target value. Based on the error gradient calculated, the target is set to minimize the prediction error. Unlike AdaBoost, the Gradient boosting regression optimizes the loss function more effectively and more generic to any loss function.

V. RESULTS AND DISCUSSION

In this section, we analyse the results obtained using ML prediction models. Initially we create a simple linear regression model for the existing dataset as in fig.1 and obtain the p values of each attribute. The attributes, also called as predictors or estimators, selected from the existing dataset can be grouped under 3 categories:

• Azimuth, Pitch and Roll representing the mobile orientation parameters in the experimental setup [1],

• acc_x, acc_y and acc_z denote the acceleration/mobility parameters in the x, y, z directions respectively,

• SQI (signal quality index), MCS (Modulation Coding Scheme),RSSI(Received signal strength indicator) represent metrics to determine effective Wi-Fi connection.

Next we perform a reliability test for the network attributes chosen as predictors in the dataset to detect multi collinearity issue. The inter-dependence among the attributes is verified through VIF evaluation and correlation coefficient matrix. Then the identified unreliable attributes are eliminated before training the prediction model. The detailed analysis is presented as follows.

Fig 1. shows a plot of the linear regression model of the training data set. The results in table 1 show 72% prediction accuracy, however, the p values of Azimuth and Pitch are high indicating multi collinearity or inter dependence among the predictors. Hence we conduct multi collinearity test by calculating the VIF (Variance Inflation Factor) for each of the network 9 attributes.

Figure 1. Linear Regression model
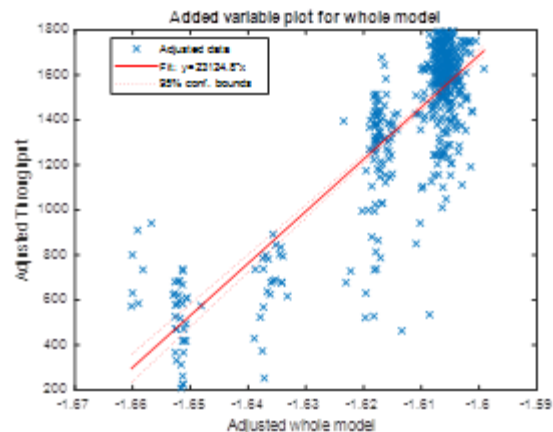
Throughput ~ 1 + Azimuth + Pitch + Roll + acc_x + acc_y + acc_z + MCS + SQI + RSSI

Table 1. Estimated Coefficients

	Estimate	SE	tStat	p Value
(Intercept)	38687	14969	2.5846	0.010048

Azimuth	-1.2683	6.244	0.20312	0.83912
Pitch	2.2236	12.094	0.18386	0.8542
Roll	23120	9356.1	2.4711	0.013819
acc_x	281.54	166.97	1.6862	0.092415
acc_y	-159.58	129.37	-1.2335	0.21801
MCS	173.95	7.8404	22.186	2.29E-75
SQI	4.4941	1.8432	2.4382	0.015126
RSSI	41.498	7.9796	5.2005	2.96E-07

Number of observations: 485, Error degrees of freedom:475

Root Mean Squared Error: 203

R2 _score: 0.726, Adjusted R-Squared: 0.721

F-statistic vs. constant model: 140, p-value = 1.99e-127

Table 2. Results of VIF analysis

Predictors	R^2 _score	VIF
Azimuth	0.985905	**70.94965198**
Pitch	0.981792	**54.92189628**
Roll	0.474072	1.901400388
acc_x	0.172295	1.208160361
acc_y	0.043697	1.045693749
acc_z	0.193035	1.239210908
MCS	0.401242	1.670122912
SQI	0.375286	1.600732775
RSSI	0.528637	2.121506868

A VIF value > 5 is generally considered as a high score. It does not contribute much to the dependent variable and can be removed from the predictors set. From the VIF analysis shown in table 2, we conclude that the predictors Azimuth and Pitch show a very high VIF score. However, before eliminating these two predictors, we evaluate the correlation matrix of all the predictors. The high values of correlation coefficients as indicated in table 3 and figure 2 for azimuth and pitch confirm that these two predictors can be eliminated.

Table 3. Correlation coefficients of Predictors

	Azi*	Pitch	Roll	acc$_x$	acc$_y$	acc$_z$	SQI	MCS	RSSI
Azi*	1.00	-0.99	0.88	-0.02	-0.07	0.05	-0.50	-0.04	-0.25
Pitch	-0.99	1.00	-0.85	0.00	0.05	-0.06	0.50	0.07	0.22
Roll	0.88	-0.85	1.00	-0.01	0.00	0.09	-0.50	-0.18	-0.43
acc$_x$	-0.02	0.00	-0.01	1.00	0.08	0.41	0.03	0.00	-0.01
acc$_y$	-0.07	0.05	0.00	0.08	1.00	0.02	0.07	-0.05	-0.01
acc$_z$	0.05	-0.06	0.09	0.41	0.02	1.00	-0.01	0.03	0.00
SQI	-0.50	0.50	-0.50	0.03	0.07	-0.01	1.00	0.16	0.00
MCS	-0.04	0.07	-0.18	0.00	-0.05	0.03	0.16	1.00	0.58
RSSI	-0.25	0.22	-0.43	-0.01	-0.01	0.00	0.00	0.58	1.00

Azi* - Azimuth

A.   Performance Metrics

(a)   _score:

_score is the statistical measure of changes in predicted output which could be determined from the input data points. This validates the performance of model in fitting to the training data points presented. _score tabulated are for the new testing inputs which in turn validates that the model could generalize and predict accurately for new inputs too.

$$R^2 \_ Score = (1 - (\frac{\sum(y_{obs} - y_{pred})^2}{\sum(y_{obs} - mean(y_{obs}))^2}))$$

(1)

Y_{obs} refer to the actual observed values from dataset and the y_{pred} refers to the predicted value. Closer the value of R2_score to 1, better the prediction model for the dataset of interest.

(b) RMSE:

The root mean squared error quantifies the fluctuation in the predicted output with respect to the actual target per dataset. This defines the correctness of the prediction by the proposed regression models.

$$RMSE = \sqrt{(\frac{\sum(y_{obs} - y_{pred})^2}{N})} \quad (2)$$

Y_{obs} refers to the actual observed values from dataset and the y_{pred} refers to the predicted value. N refers to the total number of data points considered. Lesser the RMSE value, better the prediction model for the dataset of interest
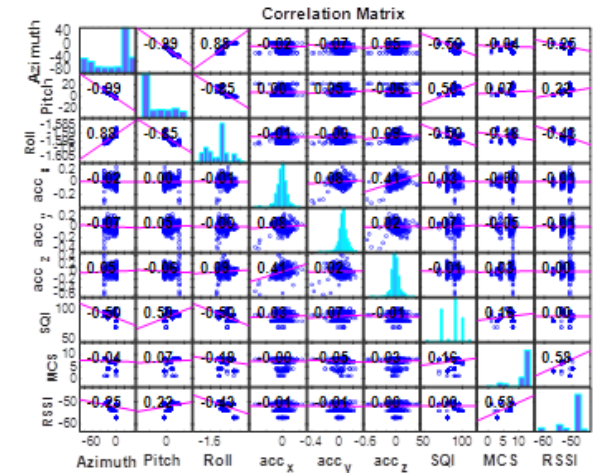
Figure 2. Correlation matrix of Predictors

(c) MAE:

Mean absolute error measures the absolute deviation in the predicted output with respect to the actual output averaged over all the observations. The error calculated is linear value in contrary to the quadratic calculation done through RMSE,

$$MAE = (\frac{\sum|y_{obs} - y_{pred}|}{N}) \quad (3)$$

Y_{obs} refers to the actual observed values from dataset and the y_{pred} refers to the predicted value. N refers to the total number of data points considered. Lesser the MAE value, better the prediction model for the dataset of interest.

(d) MAPE:

Mean absolute percentage error is measure of percentage of accuracy of the model prediction with respect to actual values

$$MAPE = \frac{1}{N}\sum \left| \frac{y_{obs} - y_{pred}}{y_{obs}} \right| \quad (4)$$

Y_{obs} refers to the actual observed values from dataset and the y_{pred} refers to the predicted value. N refers to the total number of data points considered. Lesser the MAPE value, better the prediction model for the dataset of interest.

Table 4. Comparison of the metrics evaluated by regression ML algorithms considering (a) All Predictors (b) without azimuth (c) without pitch (d) without pitch and azimuth

Algorithm	R²_score	RMSE	MAE	MAPE
Linear	0.623053	224.5042	165.5352	0.162341
AdaBoost	0.729912	193.6567	156.1791	0.136525
Random Forest	0.72079	196.9002	136.4519	0.134534
Gradient Boosting	0.843233	147.5395	116.5657	0.099601
(a)				

Algorithm	R²_score	RMSE	MAE	MAPE
Linear	0.624104	224.1911	165.3836	0.162104
AdaBoost	0.727354	194.5716	160.0706	0.139501
Random Forest	0.720871	196.8715	136.3759	0.134395
Gradient Boosting	0.835892	150.9544	117.882	0.099753
(b)				

Algorithm	R²_score	RMSE	MAE	MAPE
Linear	0.623689	224.1911	165.4697	0.162167
AdaBoost	0.740791	189.7165	153.6088	0.136981
Random Forest	0.720795	196.8982	136.4195	0.134531
Gradient Boosting	0.854165	142.3022	111.7912	0.095813
(c)				

Algorithm	R²_score	RMSE	MAE	MAPE
Linear	0.620997	225.1157	165.9722	0.162701
AdaBoost	0.743324	188.7875	153.8104	0.135816
Random Forest	0.720675	196.9406	136.4465	0.134583
Gradient Boosting	0.772975	177.5486	132.0248	0.122157
(d)				

B.   Performance analysis:

The 80% of the dataset is considered for training and remaining 20% of dataset is used for validation. The metrics tabulated corresponds to the testing part of dataset to make sure the model has generalized and didn't over fit to the training inputs. Among the machine learning techniques considered, from table 4a, the Gradient boosting algorithm provides the best fit with the R2_score closer to 1. The RMSE, MAE and MAPE values are minimal for Gradient boosting algorithm in comparison with other techniques which confirms the best accuracy of throughout prediction. Linear regression technique exhibits the lowest accuracy in the techniques considered.

The input feature selection is vital for best prediction of the output. Among the features chosen, Azimuth and Pitch exhibits the high p-values. Thus the prediction is performed ignoring Azimuth alone (Table 4b) and Pitch alone (Table 4c). The performance metrics showcases almost same values which confirm that those parameters are of lesser contribution to the throughput prediction. The table 4d enlists the performance metrics when both the Pitch and Azimuth are removed from the input features list. It can be noted that when both metrics are removed, Gradient boosting regression shows the reduction in prediction accuracy. This further ensures the sensitivity of throughput with respect to significant orientation parameters Azimuth and Pitch which isn't accounted by rest of the techniques.

C.   Computational performance analysis

The prediction latency would be influenced by the number of features, number of estimators chosen and also the model complexity. Among the methods considered, as in fig 3, when the data points were considered for prediction one by one, the Random forest consumes the higher prediction delay which peaks up to 10000µs and AdaBoost with medium delay of 3000µs. Linear regression technique and Gradient boosting consumes almost 0µs as it was so instant with very few outliers. This in turn favours the use of Gradient Boosting regression technique for the throughput prediction.

Further as in Fig 4, when the data points are used in bulk of 100 at a time, the prediction latency stands similar with lesser delay for linear regression and Gradient Boosting regression technique. Thus in addition to the good accuracy, the computational performance favours the gradient boosting regression technique.
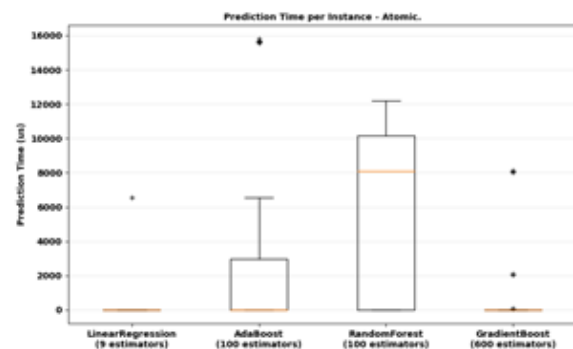

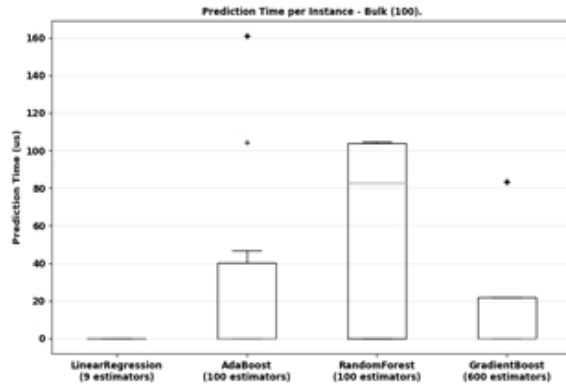Figure 3. Latency Prediction – Atomic

Figure 4. Latency Prediction – Bulk

VI.   CONCLUSIONS

We presented a comparative analysis of ML regression algorithms for predicting throughput of 802.11ad Wi-Fi network. Our analysis confirms that the throughput can be well predicted for wireless communication devices operating in 60GHz unlicensed spectrum using careful selection of network predictors. The throughput prediction accuracy of the algorithms was improved through the reliability tests and elimination of correlated predictor variables. The performances of the four popular regression algorithms were compared in terms of four different error metrics. The Gradient boosting regression technique outperformed the other techniques in terms of throughput prediction accuracy as well as latency.

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A Survey on Transfer Learning for Various Categories of Learning Techniques

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Abstract—**Over the last decade, advances in the field of information technology have grown significantly, especially in domain of machine learning and deep learning. The training and testing data required for various machine learning techniques must have same feature space and follow identical data distribution. If there are some variations either in the feature space or data distribution, there will be a great negative impact in the prediction that model provides. Currently, transfer learning has emerged as a different framework to deal with these problems. Transfer learning is an extension of machine learning and deep learning strategies where a model developed for one kind of task can be use again to create a model for another task. Both these tasks may differ in feature space or data distribution or both. Data collection and labeling can be an expensive process and can take more time. Transfer learning makes use of existing data and bypasses data labeling.**

Keywords— transfer learning, machine learning, feature space, data distribution, supervised, unsupervised, reinforcement learning

I. INTRODUCTION

There are three categories of learning techniques, supervised, unsupervised, and reinforcement learning. All these learning categories are used for various kinds of multidisciplinary problems. Supervised learning is a collection of algorithms that make use of known data, that include input and output data, as train data for the purpose of prediction.[1]The training dataset is comprised of sample data defined by various set of features and one or more labels. The model which is trained on train data is used for test dataset to predict the labels. But the formulation of the dataset labelling is an expensive process in terms of time and effort. Unsupervised learning method did not require a complete set of dataset for the training. Due to this, unsupervised learning method lower the cost of dataset labelling formulation, but the accuracy of prediction is lower than supervised learning technique. In short, supervised, and unsupervised techniques use labeled/unlabeled data samples to train a predictive model.[2]

For supervised as well as unsupervised learning techniques, training and testing data samples must have similar feature space and follow identical data distribution. Supervised learning techniques are categorized into classification and regression problems, whereas clustering is an unsupervised learning method. The necessity of transfer learning arises when the data can be outdated. In such a condition, the labeled data from one time-period may not have the same distribution in a subsequent period time.[3] Reinforcement Learning (RL) allows an agent to take a sequence decisions

and appropriate actions in an interactive environment to maximize the reward.

Fig. 1[4] shows the distinction between traditional way of machine learning technique and transfer learning technique. For traditional machine learning, for two tasks, machine learning techniques were applied on datasets separately. But, in transfer learning, task-1 is completely trained using a dataset that composed of large number of sample data and then transfers the knowledge acquired from task-1 onto task-2 to increase the level of accuracy and lower the time required for learning.
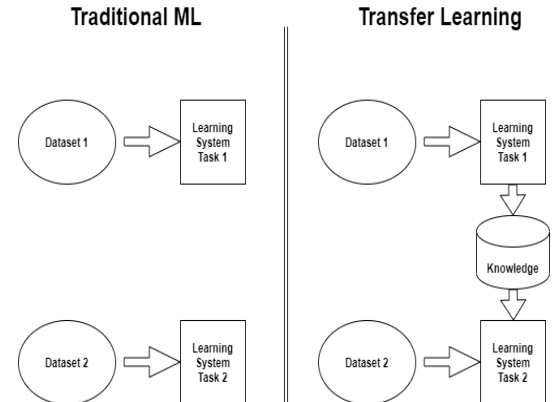
Fig. 1. Traditional Machine Learning vs Transfer Learning

II. LITERATURE SURVEY

A. Transfer Learning for Regression

Regression is one of the kinds of prediction modeling that explores the association between a dependent and independent variable. It is used for forecasting, time series modeling, and understanding the causal effect relationship between two or more variables. For example, prediction of student marks based on number of study hours, predict rainfall based on environmental conditions, prediction of vehicles sales based on GDP data, etc. Various regression techniques are linear, logistic, and polynomial regression.

Chuanting Zhang et al.[5], explored the prediction of intelligent traffic using deep learning strategies for cellular networks. Transfer learning method between various types of cellular traffic sample data was studied. Experiments were performed using real-world cellular traffic data samples and findings had demonstrated the effectiveness of the suggested model. The performance evaluation parameters had indicated the need of presenting datasets from the cross domains to improve the prediction of future cellular network traffic.

Chuang Sun et al.[6], proposed "Deep Transfer Learning (DTL)" network strategy built-on sparse autoencoder. In this DTL technique, three transfer strategies were used, i.e., weight transfer, hidden feature, and weight update. By using these three strategies of transfer, new object prediction without training of supervised data was achieved. One class of past failure sample data was used to train DTL, and then transferred the required knowledge parameters to the target domain, that gives an efficient way to predict with a smaller number of past failure sample data. Sandeep Kumar et al.[7], proposed a new way to calculate approximately the GDP of a country from available carbon emission data samples. The neural network or machine leaning model was trained using data samples of developed nation and utilized it to test the data samples of developing nation. The Authors used root mean square error to check the performance of neural network and machine leaning.

B.   Transfer Learning for Classification

Classification is a supervised learning technique where data is divided into various groups based on the characteristics of those data. For example, whether a bank grants a loan or not, whether the received mail is genuine or spam, executable is malware or benign, etc. Various Transfer Learning models can be used for classification problems like, VGG-16, VGG-19, AlexNet, GoogLeNet, ResNet50, Inception, eXception, etc. All these Transfer Learning models can be reused with little or no modification on different classification problems. These models are already trained so that training time can also be saved. These models have common layers: (i) Input layer to which sample data in the form image will be given (ii) Convolution layer that apply the process of convolution on image using various kinds of filters (iii) Max pooling layer that extract the most important characteristics of image and ignore the less relevant one (iv)Fully connected layer which is used to produce results in flatten form before final classification output (v) Output layer that finally gives the classification label. The count of these layers in transfer learning models is different. Fig. 2.[8] shows layers of pre-trained CNN model which are reused for image classification.
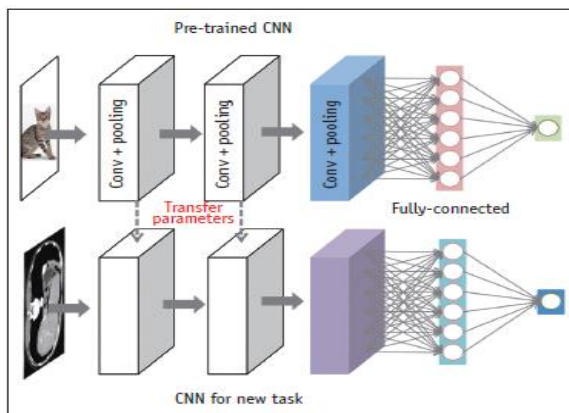

Fig. 2. Transfer Learning model used for Image classification

Jaclynn J. Stubbs et al.[9], used AlexNet and GoogLeNet transfer learning models. Using 2- state classifier, AlexNet worked best that attained 100% accuracy, GoogLeNet attained 99.5% accuracy, while SVM attained 76% accuracy that can be enhanced by adding more data points to the training set and increase the stability of the system. For 4-state classifier, AlexNet worked best, achieved 100% accuracy, GoogLeNet achieved 96.2% accuracy, whereas, using SVM, the system was very unreliable.

So Yeon Jo et al. [10], proposed a transfer learning method for categorization of vehicles. This method used convolutional neural network that was trained on large number of data samples. Experimental findings show up that the suggested system provided 98.3% accuracy, which was 32.6% more than the standard technique with no transfer learning. The Authors used those characteristics of the VGG16 model that slow down the performance and applied fine tuning to improve the level of accuracy.

Ahmed Hijab et al.[11], suggested three techniques of training: (i) Baseline technique: Convolutional neural network was trained from scratch (ii) Transfer learning technique: Used already trained VGG16 model (iii) Fine-tuned learning technique: Parameters of deep learning neural network were modified that solved the problem of overfitting. The experimental findings determined that the fine-tuned learning technique attained the finest performance compared to other two techniques.

A. Sai Bharadwaj Reddy et al.[12], proposed transfer learning technique for the categorization of malarial infected cells. This technique increases the level of accuracy of diagnosis. The experimental findings show up that transfer learning technique works better on cell images. The Authors used the ResNet-50 model for transfer learning.

C.   Transfer Learning for Clustering

Clustering is unsupervised machine learning technique that interprets the input data and finds natural classes or clusters. Data present in the same class is different to those present in other classes. For example, to find different species of plants and animals, to find earthquake areas, customer segmentation, etc. Various clustering algorithms are k-means clustering, DBSCAN, CURE, BIRCH.

Wei Sun et al. [13], suggested transfer learning strategy for document categorization by using clustering technique. Authors used DBSCAN algorithm, then KNN algorithm to form a cluster of data samples, and finally, K-means algorithm was used to categorize the documents into various groups. Experimental findings proved that the suggested strategy provided improved performance.

S. Ephina Thendral et al.[14], focused on giving recommendations in a sparsely graded area by transferring the knowledge from highly graded domain. The proposed cross domain system was tested with various clustering techniques and finally evaluated the performance of each one. Wenjie Zhang et al.[15], proposed use of similar clusters of features as a knowledge transfer parameter. This method provided the assurance to approximate the resemblance of clusters consisting of common words across

distinct domains, instead of similar kind of domains. Authors evaluated the approach by performing experiments on the reviews of Amazon product. The findings showing that the method attained improved accuracy than the standard techniques.

Zibin Li et al. [16], proposed a transfer learning strategy that used TrAdaBoost and k-means algorithms to solve the problems of superfluous data in the dataset of source domain and the heavyweight drop. Authors divide the source and target dataset into various groups. Then performed cluster analysis in every group and get rid of those that don't gather with the target data. After that author applied the process of the dynamic TrAdaBoost.

D. Transfer Learning for Reinforcement Learning

Reinforcement Learning (RL) allows an agent to learn in an interactive environment by taking trial and error actions responses from earlier actions and experiences.

It is about taking a set of actions to maximize reward in a particular situation. For example, chess game, autonomous car, reduce pollution. Various algorithms are Model-free RL and Model-based RL.

Kun Shao et al.[17], authors proposed a curriculum transfer learning strategy that controls several units in StarCraft micromanagement. Authors used neural network as approximation function for the calculation of action-value and proposed a reward function for possible moves and attacks. Transfer learning technique was used to enhance the learning performance of model for more difficult scenarios, that accelerates the training process. In small-scale situations, units can learn successfully having 100%-win rates. But, in large-scale situations, group of units were trained by using transfer learning strategy, and it show up better performance than other standard techniques.

III. SUMMARY

Transfer Learning provides a better solution for all categories of learning techniques. In Transfer Learning, model created for one kind of problem can be reused for another related kind of problem with little or no modification. Whenever there is a requirement to develop a learning model for any problem, instead of developing a model from scratch, identify any pre-trained model of somewhat related problem. We can use this pre-trained model on target domain that saves time and effort. Also, it may give better accuracy and performance.

IV. CONCLUSION

In this survey paper, I have reviewed usage of Transfer Learning for different categories of learning techniques like Supervised, Unsupervised and Reinforcement Learning. Most earlier work focused on the first two learning categories. Application of transfer learning in Reinforcement Learning may attract more attention in the future. Machine learning models can be used for this but due to different data distribution or feature space in source and target domains, they may not give better accuracy or

performance. Transfer Learning provides a better solution for this where the model created for source domain can be use again for the target domain where data distribution or feature space can be different. It saves a lot of training time of the model because model is already trained for source data.

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Air Canvas: Draw in Air

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Abstract- **Air Canvas has been developed to bridge the gap in communicating a concept or presenting an idea in the real-world space. Air canvas makes all easy to the user. With AIR-CANVAS we present the thought of the increased reality material for data representation. This is past the customary void (white), rectangular, and level dimensional material seen in customary data representation. The venture proposed in a Python 3.6 and it utilizes the exceptionally well known OpenCV library. OpenCV is a PC vision and AI programming library that incorporates numerous normal picture examination calculations that will assist us with building custom, savvy register vision application.**
Keywords – Opencv, Contour, Tracking, numpy.

I. INTRODUCTION

At any point needed to draw your creative mind simply by deferring your finger in air. PC Vision is an interdisciplinary logical field that arrangements with how PCs can be made to acquire significant level comprehension by utilization of numerous computerized ways. In this undertaking we will fabricate an Air Canvas which can draw anything on it simply by catching the movement of a finger with Webcam. We will utilize the PC vision procedures of OpenCV to fabricate this task. The favored language is python because of its comprehensive libraries and simple to utilize linguistic structure however understanding the fundamentals it very well may be carried out in any OpenCV upheld language. Here Color Detection and following is utilized to accomplish the target.

A. **Air Canvas: -** Air Canvas is a without hands computerized drawing material that uses, a camera and OpenCV to perceive and plan hand signals onto a screen.

B. **Contour: -** Shapes can be clarified just as a bend joining all the constant points (along the limit), having same tone or power. The forms are a valuable instrument for shape examination and item location and acknowledgment.

II. MOTIVATION

The underlying inspiration was a requirement for a dustless study hall for the understudies to concentrate in. I realize that there are numerous ways like touch screens and then some yet what might be said about the schools which cannot bear the cost of it to purchase such gigantic huge screens and instruct on them like a T.V. Along these lines, I thought why not can a finger be followed, however that too at an underlying level without profound learning. Consequently, it was Open CV which acted the hero for these PC vision projects.

III. EXISTING SYSTEM

The advanced pen comprises of a tri pivotal accelerometer, a microcontroller, and a RF remote transmission module for detecting and gathering speed increases of hand composing and motion directions. Our implanted venture first concentrates the time-and recurrence space highlights from the speed increase signals and, then, at that point, sends the signs by utilizing RF transmitter. In beneficiary segment RF signs can be gotten by RF recipient and given to microcontroller. The regulator processes the data lastly the outcomes can be shown on Graphical LCD.

IV. PROBLEM DEFINITION

Item following is considered as a significant undertaking inside the field of Computer Vision. The development of quicker PCs, accessibility of cheap and great quality camcorders and requests of robotized video investigation has given ubiquity to protest following methods. For the most part video investigation system has three significant stages: initially distinguishing of the item, besides following its development from one casing to another and ultimately breaking down the conduct of that article. Who don't need to simply move their fingers in air and get their ideal picture

V. LITERATURE SURVEY

A. Tracking of Flexible Brush Tip on Real Canvas: Silhouette-Based and Deep Ensemble Network-Based Approaches
Author-Joolekha Bibi Joolee , Ahsan Raza, Muhammad Abdullah, Seokhee Jeon
Working- The proposed profound outfit network is prepared disconnected utilizing information caught through an outer tracker (Opt track V120) and the
outline based approach. During genuine drawing, the prepared organization appraises the brush tip position by

taking the brush handle act like an information, permitting us to utilize genuine material with a genuine brush. During the testing system, the framework works continuously, since around then, it tracks the brush handle present (position and direction) and the proposed profound troupe network takes this brush handle act like info and predicts the brush tip position in genuine time. For information assortment, played out various strokes for 60 seconds on a superficial level inside the following area.

Advantages- Proposed a profound gathering network that predicts the brush tip position by taking the brush handle position and brush direction as information.
The proposed profound gathering network is fit for assessing the brush tip position with extremely less error (+1 or - 1). The created drawing by the outline based methodology using real brush tip position and profound troupe network-based methodology utilizing the anticipated brush tip is comparable to genuine drawing.

Disadvantages- Still necessities an extraordinarily adjusted edge and cameras and has inadequacy in usability. Only consider a standard size brush. System just tracks the brush handled present.

B.   Augmented Airbrush for Computer Aided Painting (CAP)
Author-Roy Shilkrot, Pattie Maes, Joseph A. Paradiso, and Amit Zoran
Working- To work our expanded artificially glamorize, the client remains before the material, allowed to chip away at any piece of the composition, utilize any style, and counsel the PC screen in the event that the person wishesThe reference and material are lined up with an aligned focus point that relates to the virtual beginning. The client can move the gadget utilizing a coordinated strategy (testing the material, cutting it, journeying shapes, and so on), a more instinctive one (irregular strolling or nearby spotlight on a solitary region), or a blend of both.The PC will mediate just when the virtual following compares with a paint projection that disregards a virtual reference. In such a case, the PC will keep the client from utilizing the maximum capacity of the artificially glamorize trigger (see next area) and applying paint where it isn't needed.A gadget depends on a Grex Genesis.XT, a gun style digitally embellish mitigated of its back paint-volume change handle. Since this is a double activity artificially glamorize, working the trigger opens both the compelled air valve and the paint liquid valve, which is made of a needle and a spout, bringing about a stream of air blended in with paint particles.They fostered a specially crafted expansion component, to permit advanced control of the paint combination. A Grex air blower supplies compressed air at 20 PSI, and a Polhemus Fastrack attractive movement global positioning framework positions the gadget in 6DOF.

Advantages- Model can recognize overflow hazard assuming it arrives at saturation.The model incorporates custom equipment and a calculation taking into account constant trigger augmentation.The computerized artificially glamorize permits clients to encounter the manual artwork process, with the interesting actual antiquities of the outcome. Gadget recovers realistic characteristics that supplement existing PC simulationsunique results and solitary curios, addressing ongoing states of being of artificially glamorize painting. This work is an immediate augmentation of a developing arrangement of brilliant hand-held apparatuses that challenge conventional HCI standards of virtual.

Disadvantages- Since the actual model is certifiably not a total actual reenactment of the air and shade water liquids, it doesn't mimic paint shift in weather conditions or overflows. At the point when a client presses the trigger just softly while the paint liquid valve is as yet shut, a modest quantity of paint actually leaks through it

C.   3D Drawing with Augmented Reality

Author-Sharanya M, Sucheta Kolur , Sowmyashree B V, Sharadhi L, Bhanushree K J
Working-A mobile application that runs on Android devices and lets the user draw on the world, treating it as a canvas, implement real-time sync of the drawing on all instances of the application running in the same network room and provide a tool for creative content producers to quickly sketch their ideas in3D spaces. The Freehand procedure permits the client to draw constantly as coordinated by hand developments. To begin a line the client plays out the air-tap motion. The line is drawn constantly at the list cursor position until the client ends the line by playing out a subsequent air-tap.

Advantages-It provides unique techniques of presenting content and ideas. The application deals with Android utilizing the AR abilities of AR Core.It is a continuous multiplayer and permits two clients to see content at the same time and updates the new substance produced realtime.

Disadvantages-AR   applications   drain   so   much

battery.The degree of accuracy of re-localizing the content placed on the world canvas can be greatly improved. Volumetric training and point cloud data classification can be added to the application.

VI. PROPOSED SYSTEM

In proposed framework, going to utilize webcam and show unit (monitor screen). Here, utilizing pen or hand for drawing and attracting front of the camera then we will attract front of it will be shown on the presentation unit. Our installed framework is fit for interpreting time-series speed increase signals into significant component vectors. Clients can utilize the pen to compose digits or make hand motions and so forth can be shown on the presentation unit
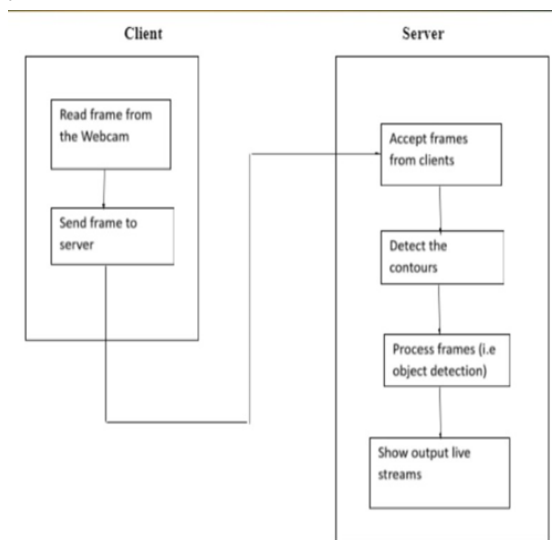
Block Diagram

A. Modules of Proposed System
1. Color Tracking

Understanding the HSV (Hue, Saturation, Value) shading space for Color Tracking. Furthermore, following the little hued object at fingertip. The approaching picture from the webcam is to be changed over to the HSV shading space for recognizing the hued object at the tip of finger.

2. Trackbars

When the trackbars are arrangement, we will get the realtime esteem from the trackbars and make range. This reach is a numpy structure which is utilized to be passed in the capacity cv2.inrange(). This capacity returns the Mask on the hued object. This Mask is a high contrast picture with white pixels at the situation of the ideal tone.

3. Contour Detection

Recognizing the Position of Colored item at fingertip and shaping a circle over it. We are playing out some morphological procedure on the Mask, to make it liberated from contaminations and to distinguish shape without any problem. That is Contour Detection

4. Frame Processing

Following the fingertip and drawing focuses at each position for air material impact. That is Frame Processing.

5. Algorithmic Optimization.

Fixing the Minor Details of the code to work the program without a hitch. Algorithmic Optimization.

VII. DESIGN DETAILS

We will utilize the PC vision methods of OpenCv to fabricate this venture . The favored language is Python because of its thorough librabries and simple to utilize grammar yet understanding the fundamentals it very well may be carried out in any OpenCv support language.

A. Hardware Requirements
1. Webcam: A webcam is a video cam that feeds or transfers a picture or video progressively to or through a PC organization, like the Internet.

Webcam

2. Display Unit (Screen):- Means "Visual Display Unit." A VDU shows pictures created by a PC or other electronic gadget. The term VDU is regularly utilized interchangeably with "screen," however it can likewise allude to one more kind of show, like a computerized projector

Display Screen

B.   Software Requirements

●   Open Cvlibraries
●   Numpy
●   Python

1.   OpenCV: Python is a library of Python ties intended to tackle PC vision issues. OpenCV-Python utilizes Numpy, which is an exceptionally upgraded library. OpenCV is a friendly language to work with.

2.   Numpy: NumPy is the essential bundle for logical processing in Python. ... NumPy exhibits work with cutting edge numerical and different kinds of procedure on enormous quantities of information.

3.   Python: Python is a translated, object-arranged, certain level programming language with dynamic semantics. Python utilizes extremely advantageous language and assists with utilizing it easy to use. Python uses   very convenient language and helps to use it user friendly

VIII.   USE CASE DIAGRAM
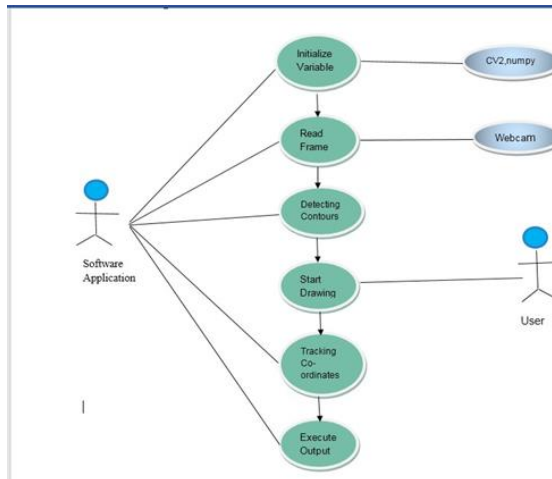
IX.   ALGORITHM

Stage 1:- Start perusing the casings and convert the caught edges to HSV shading space (Easy for shading location).
Stage 2:- Prepare the material casing and put the individual ink fastens on it.
Stage 3:- Adjust the track bar esteems for tracking down the veil of the hued marker.
Stage 4:- Preprocess the veil with morphological   tasks (Eroding and expansion).
Stage 5:- Detect the forms, observe the middle directions

of biggest shape and continue to store them in the exhibit for progressive casings (Arrays for drawing focuses on material).
Stage 6:- Finally draw the focuses put away in an exhibit on the edges and material.

X.   OBJECTIVES

● To create the mask of color object using contour detection techniques.
● Color Tracking of object at fingertip.
● To make a model for a drawing instrument that utilizations hand signal acknowledgment programming to paint/draw on a Display unit (screen).
● Mapping co-ordinates extracted from hand recognition software to produce a drawing.
● To make dustless study hall for the understudies to concentrate in.
● No compelling reason to contact the PC once the program is run.

XI.   SCOPE

While there has been a blast of man-made brainpower based programming for workmanship over the most recent couple of years, people, for example, kids and the old regularly don't approach these cutting edge AI models that are right now being created. We move toward filling this hole by making an instinctive interface and application that is redone for supporting the client in their visual articulation. Clients are engaged to rapidly make different imaginative representations in a community oriented exertion between the client and the framework, and an incorporated arrangement of AI models takes into consideration a clever reaction from the framework

XII.   CONCLUSION

The undertaking Air Canvas: Draw in Air has been effectively planned and tried. It has been created by incorporating elements of all the equipment parts and programming utilized. Presence of each module has been contemplated out and set cautiously accordingly adding to the best working of the Secondly we utilized a general programming language called python, NumPy python library which working with exhibits and the assistance of developing innovation the undertaking has been effectively executed. With Air Canvas, we have accomplished a sans hands drawing program that utilizes OpenCv to recognize the clients point finger. Brilliant lines can be drawn any place the client wants. No

compelling reason to contact the PC once the program is run.

XIII. ACKNOWLEDGMENT

Our colleagues are genuinely appreciative to that multitude of individuals who have been providing us with any sort of help with the creation of this task report.

We would therefore, create a large portion of the open door by communicating our sincerest gratitude to every one of my resources whose lessons gave us theoretical arrangement and lucidity of understanding, which eventually made our occupation all the simpler. Credit likewise goes to every one of my companions whose support kept us in great stead. Their constant help has given me the strength and certainty to finish the undertaking with no trouble

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E-Authentication System with QR Code and OTP

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Abstract— **Password assumed a significant part during the time spent verification. In course of validation, The Password entered by the customer will be conveyed along the traffic to the confirmation server to allow the server to permit permission to the endorsed customer. The aggressors will use the chance to attempt to sniff others individual mystery word to play out some criminal tasks by using other's character to shield them from bother. In this paper, the as of late proposed game plan will be used to update the security of the structure. The approach took on is The One Time Password, Hashing Algorithm and Two-Factor Authentication. There moreover one more game plan will be added by using the QR code to help with saving more data. The objective of the system result is to redesign the current login approval structure. It offers responses for making secret expression breaking more irksome similarly as convinces customers to pick and set hard-to-break passwords.**

***Keywords-* QR code, formatting, QR-Code Authentication, QR Code Encryption, OTP Generation, Integrity**

I. INTRODUCTION

Electronic Authentication is the course of electronic affirmation of the character of a customer. E-Authentication assists with developing certainty and confidence in web- based exchanges and empowers the utilization of the electronic climate as a channel for administration conveyance. Electronic System really takes a look at the genuineness of the client and recognizes assuming the client is substantial or invalid. It saves the information of the client and gives total security to the validate client. The framework will produce a test to the client when the client is signing in. The OTP is created by consolidating client entered in the secret word and challenge produce by the framework. The client should enter in the OTP to sign in effectively. To shield from illicit admittance to client data, distant verification of clients is fundamental help in this framework.

OTP(One Time Password): The OTP confirmation framework is executed by two principle instruments. The principal system is the test reaction mode. OTP is passwords which are valid.

QR CODE: QR codes are used to store scholarly information as pictures that can be examined by any insightful contraption including most phones. QR codes can be considered as two-

dimensional normalized distinguishing pieces of proof. Actually much assessment has been done that consideration on usage of QR code and progress of the advancement for giving better customer experience. In makers have proposed a technique for setting focused QR code affirmation that can be used to give information related to explicit subject through QR codes. QR codes have similarly been used in the space of cryptography for data security. QR codes have extent of employments. Computations have been proposed and done that can allow usage of QR code for electronic ticket framework

A. Problem Statement

Validation is a development to confirm the singular confirmation that longings to play out the activity. During the time spent approval, the mysterious key enter by the customer will be sent along the traffic to the confirmation server to allow the server to surrender induction to the endorsed customer. Exactly when the mysterious expression is conveyed, the aggressors will endeavor to sniff into the association to get data that join the customer's mysterious key. At this point, there is rainbow table which prepared to follow the mysterious expression with the hash estimation to get the customer's mysterious key. At the point when the mysterious expression is won to be unscrambled, the aggressors can use the customer capability to achieve something unlawful, for instance, deception others which will cause the customer lost in credit. In the proposed plot, the customer can without a doubt and viably login into the system. We take apart the security and convenience of the proposed plan, and show the resistance of the proposed plan to hacking of login accreditations, shoulder surfing and impromptu login.

B. Objective

The essential objective is to do a safe login approval structure with utilizing with two-factor checks. By using the thought two-factor approval could help with growing the strength of the login structure. The assailant should go through the following hindrance of guard to progress to sign in. This framework will assist with upgrading the login confirmation framework. Next objective is to guarantee login secret key won't be communicated over the organization. When contrasted with the past arrangement, the secret word is recently encoded, yet the assailants may prevail to decipher the information and recover the secret phrase. So to forestall this happens, the

secret key with the unpredictable key should be hash before the sender sends the secret word to the server. Secure the secret key of the customer.

Aside from that, the third genuine will be to make the one-time secret phrase disconnected. This will help in play out the login framework in the event that there is a confined relationship of wi-fi or portable sign is feeble. It will help the customer who lives in the totally open which has a frail telephone signal.

II.   LITERATURE REVIEWS

E-Voting inconceivably diminishes direct human control and effect in projecting a voting form cycle.This gives a chance to tackling some old discretionary issues yet additionally presenting entire scope of new concern. The e-casting a ballot framework gives a democratic help that permits individuals to cast a ballot from any survey site in the nation electronically. This framework incorporates lawful, administrative, sociological and conduct parts of the current democratic framework, while adding accommodation and safer climate to casting a ballot interaction. Innovation overhauls in political race are continually difficult tasks that require cautious, pondering and arranging. Presenting e-casting a ballot is likely most troublesome overhaul as this innovation contacts the center of the whole appointive cycle the projecting and counting of votes[1]

Net banking is one the most fundamental system which the web based customers use in their regular presence This structure has been seeing development in the amount of customers on an unsafe rate. But a huge piece of the banks ensure that net banking is given 100% electronic security anyway there are at this point various customers who are reluctant and contend for higher security essentials In solicitation to safeguard from illegal induction to customer information, far away approval of customers is principal help in this structure In 1981, Lamport initially introduced the one-time secret expression affirmation plot with use of single bearing hash tie Hence to create series of passwords the game plan of hash regards are bound. In any case, recently there have been various systems used for approval during net banking. By far most of them incorporate the use of one time passwords and they contrast simply in the strategy for passing on them to users[2]

A considerable lot of the administrations that we utilize day by day, for instance banking, have changed from customary client administrations into Internet administrations. As administrations that contain delicate information are moved to Internet, solid verification is needed to give a sufficiently high degree of safety and protection . With processing becoming inescapable, individuals progressively depend on open PCs to work together over the Internet accordingly making it a favored climate for a huge number of e-administrations like online business, e-banking, and so on Security for these applications is a significant empowering agent. As a rule, the secret word based verification system gives the

fundamental capacity to forestall unapproved access. Once passwords make it more hard to acquire unapproved admittance to limited assets. Numerous analysts have committed endeavors to carry out different OTP plans utilizing smartcards, time- synchronized token or SMS etc.[3]

Validating paper-based reports ordinarily requires a trained professional. This exclusively relies upon an ability of the master who can check to the reports. There are a great deal of associations which are set up to work in the space of criminological science in numerous nations. This sort of work uses unique hardware like an UV light, an amplifying glass, or an infrared reviewer to assist with the investigation. Practically speaking, it is hard for the association which has a lot of archives should have been reviewed rapidly. For example, a bank needs to work with checks, bills of trade, and receipts. . Because of the legal science work that should follow a specific system in understanding to the law, it might take a lot of time. The method might include sending the archives should have been confirmed to the police, having the expert check the report, thus on.[4]

The occurrence of extortion and falsification of a degree testament has expanded with the development innovations which are effectively accessible at less expensive expenses, for example, printing and imitating the chronicle which danger to the decency of both the support holder and the instructive establishment that has conceded the announcement. The manual confirmation of these reports is a monotonous errand since it includes numerous degree of human collaboration and it likewise a tedious assignment which forces an additional a weight to the college or universities since they need to check every one of the understudies who have passed from their school. . Henceforth, it is vital that the colleges embrace an interaction that can guarantee security of data and legitimacy of the gave certificates.[5]

III.   PROPOSED METHOD

Under the proposed framework, the customer will enter with in the username then the secret key is gotten. The server will deliver an arbitrary key with 40 characters as QR code. The telephone will then, at that point, dissect the QR code to get the subjective key. The mysterious key will then, at that point, joins the unpredictable key and hash.The server will recuperate the mysterious key from the data base then, join the subjective key and hash it. Both of those hash regard made will acknowledge the underlying 6 man as the OTP. At the purpose when it's both matches, the login is accomplishment.

A.   Registration and Login
To access the system, client have to initially enroll by entering the fundamental enlistment subtleties like name, email id, portable number, sex, and so on The framework start with the customer needs to brave the web and play the login activity. The client key in their own username and snap right away.The system will look the username

in the informational index. The system will send a mix-up message if the username doesn't exist in the informational index. Once if the username is genuine in the informational index, the site will show the login articulation of the customer. This procedure needs to do as such to get the,UTAR client from the phishing assault. We are likewise added retype password section and forgot password section that were missing in past proposed framework. Retype password section to confirm that you just have correctly entered your required password, you need to enter it a second time during this field. For Forget password user have to enter his mail, number or user name, We'd like this information to search out your account.
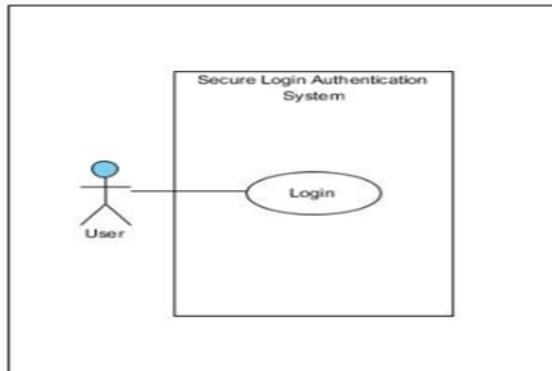

Fig. 1: Secure Login System

B.   OTP Verification And Scan QR Code

In the event that clients confirmed with username and secret key, code will get created in backend is sent over the clients email id. The server will produce the arbitrary key with 48 The irregular key will then, at that point, show as QR code on the site page. The framework moreover will recuperate the secret key of the customer and merge it with the arbitrary key and hashed it. At the purpose when the QR code is displayed within the page, the client should utilize their own telephone to test the QR code or import QR code from telephone display to urge the key. Client must examine the QR Code utilizing framework webcam to approve the QR Code sent over the mail.
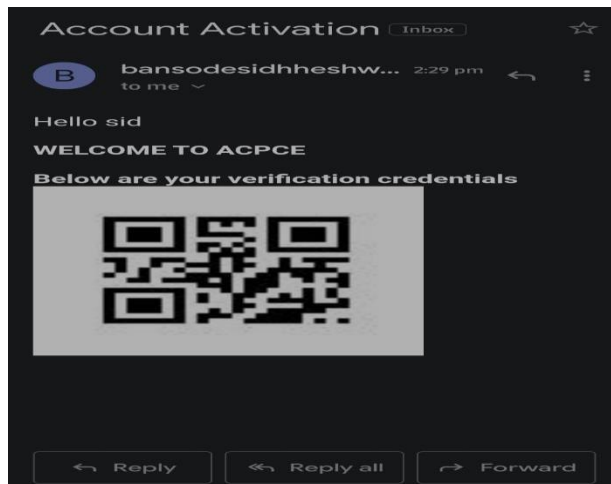

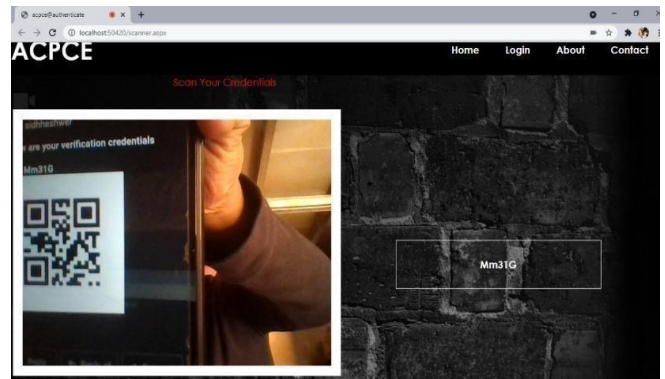Fig. 2: QR code sent over mail (To Verify user)

Fig. 3: Scanning QR code

Situation name	Step	Activity
MAIN FLOW	1	Client Enter Username
	2	Framework Check Validity ofclient name
	3	System retrieves login phase
	4	Framework show login stage
	5	Client Confirm with login stage
	6	Framework get arbitrary key
	7	Framework show random key
	8	User scan QR code
	9	System prompt user to enter a password
	10	User enter password System generate and display OTP
	11	password System generate and display OTP
	12	User enter OTP in website
	13	System check device validity of account with in the database
	14	System Display "Login Successful
ALTERNATE FLOW INVALID USERNAME	2.1.1	User enter invalid Username
	2.1.2	System Display Error Message" This username Doesn't exist, Try Again!"
	2.1.3	Back to main flow step 1.
ALTERNATE FLOW INVALID OTP	12.1.1	User enter invalid OTP
	12.1.2	Framework Display Error Message Invalid OTP
	12.1.3	Framework Generate arbitrary key
	12.1.4	Back to main flow step 7.
ALTERNATE FLOW – OTP TRIAL OVER 5 TIMES	12.1.1	Clients enter invalid OTP quite 5 times
	12.1.2	Framework send email to user that account is locked

ALTERNATE FLOW-FIRST ATTEMPLT LOGIN DEVICE	13.1.1	User use new device to aim login
	13.1.2	System send email to user to verify device
RULES	1	username should exist with in the data set
	2	OTP should be matched.

Data Flow Table

IV. FUTURE WORK

Here we implement a web application system so in future we can implement this technique for portable and desktop separately. In future developer can add some features like fingerprint sensor ,AI face detection, etc.

V. CONCLUSION

Framework fulfills the high security necessities of the web customers and guarantees them against various security attacks. These plans offer various sorts and levels of safety and request comparing complex confirmation successions and computational efforts. With in the proposed plot, the client can undoubtedly and effectively login into the framework. We investigate the wellbeing and comfort of the proposed plan, and show the block of the proposed consider to hacking of login certificates, shoulder surfing and coincidental loginThe overview and examination papers alluded give experiences into what different strategies will be meted out to additional better our solutions.

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Heart Disease Prediction Using Deep Learning Functional Approach

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Abstract: **In this modern era the leading cause of mortality among adults is the heart disease. There are many forms of heart diseases. Every kind of heart disease is having its own symptoms and treatment. Most of the heart diseases are due to the modern life styles. With the help of technological medical treatment and bringing a change in life styles health is assured to improve significantly. We are using in this paper a functional approach of deep learning to predict the heart diseases in contrast with the sequential approach of deep learning. The results of our proposed model are very satisfying and it is able to determine the presence of heart disease in an individual with greater accuracy. The method improves the medical care and the costs are also reduced. This work provides significant knowledge that can help us predict the patients with heart disease.**

Keywords: Machine Learning, Deep Learning, Functional Approach, DNN

I. INTRODUCTION

Heart Disease is described as any disorder that affects the heart. Heart diseases are of many forms such as Blood vessel disease (Coronary artery disease), heart rhythm problems (arrhythmias), heart defects (Congenital heart defects), heart valve disease, disease of the heart muscle, heart infection. Many of these heart diseases can be prevented and treated with healthy lifestyle changes.

As the technology is improving there are many Machine Learning and Deep Learning techniques available which are used to predict heart diseases and risk factors. In Machine Learning several classifiers such as supervised, unsupervised and ensemble learning are used to identify and determine the accuracy of the given dataset [1]. The Machine Learning Technique Random Forest (RF) enhances the performance of risk predictions by exploiting large datasets to determine new risk predictors. Further, Deep Learning is a favorable technique to analyze unstructured data such as speech and audio signals effectively. It uses multiple neuron layers arranged together to generate models of classification and feature selection. In this work, Deep Learning is used to analyze the medical records of patients to predict the heart diseases.

II. LITERATURE REVIEW

Heart diseases are fatal. According to a survey by Harvard Health Publishing [2] more number of victims of heart diseases are men compared to women. Much research is carried out and several Machine Learning Techniques are utilized to perform the classification and to determine the evidence of heart diseases. Melillo et.al [3] used Machine Learning CART algorithms to develop an automatic classifier to predict congestive heart failure. To improve the performance of this method Rahhal et.al [4] employed Deep Neural Networks with ECG approach. High dimensionality of data is the usual problem called curse of dimensionality [5] in machine learning. To perform operations on this vast dataset huge memory is needed. To remove less important data many feature selection techniques are proposed [6]. To detect heart diseases and to improvise the performance of various Machine Learning and Deep Learning Techniques Dun et al[7] used hyper parameter tuning. A lot of continuous research is conducted on predicting heart diseases and to diagonize it in a better way due to increased mortality rate.

III. METHODOLOGY

The methodology used to predict heart disease using functional approach in deep learning is as shown in figure 1. First we collect the patient data for analysis. Then feature scaling is done as part of data normalization. Then we build a deep neural network using functional approach. Next the normalized data is given as input to train and test the deep neural network built.
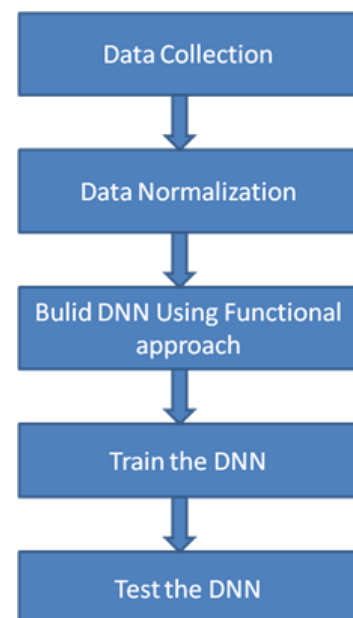

Figure 1: Model

IV. IMPLEMENTATION

The model is implemented using python libraries and keras Tensor flow is used to develop the functional Deep Neural Network.

Dataset

To predict the heart disease, we have downloaded the Heart disease dataset from kaggle. The dataset consists of 14 columns of which 13 are the attributes and the last column is the target output. The dataset has no missing values, so no need to care about null values. The 13 features are tabulated in table1.

Table 1: Features of Heart disease dataset

S.N	Feature	Meaning
1	age	age of patient in years
2	sex	1 →male; 0 → female
3	cp	chest pain type
4	trestbps	resting blood pressure (in mm Hg on admission to the hospital)
5	chol	serum cholesterol shows the amount of triglycerides present
6	Fbs	fasting blood sugar
7	Restecg	resting electrocardiographic results
8	Thalach	maximum heart rate achieved
9	Exang	exercise-induced angina (1 yes)
10	Oldpeak	ST depression induced by exercise relative to rest
11	Slope	the slope of the peak exercise ST segment
12	Ca	number of major vessels (0–3) colored by fluoroscopy
13	Thal	no explanation provided, but probably thalassemia

Data Normalization:

From the figure2- the snapshot of the dataset shown, it is clear that each feature is having a different range. For example, the maximum age is 77 whereas the maximum cholesterol value is 564. Thus, feature scaling has to be done on the dataset.

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca
count	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.00
mean	54.366337	0.683168	0.966997	131.623762	246.264026	0.148515	0.528053	149.646865	0.326733	1.039604	1.399340	0.729373 2.31
std	9.082101	0.466011	1.032052	17.538143	51.830751	0.356198	0.525860	22.905161	0.469794	1.161075	0.616226	1.022606 0.61
min	29.000000	0.000000	0.000000	94.000000	126.000000	0.000000	0.000000	71.000000	0.000000	0.000000	0.000000	0.000000 0.00
25%	47.500000	0.000000	0.000000	120.000000	211.000000	0.000000	0.000000	133.500000	0.000000	0.000000	1.000000	0.000000 2.00
50%	55.000000	1.000000	1.000000	130.000000	240.000000	0.000000	1.000000	153.000000	0.000000	0.800000	1.000000	0.000000 2.00
75%	61.000000	1.000000	2.000000	140.000000	274.500000	0.000000	1.000000	166.000000	1.000000	1.600000	2.000000	1.000000 3.00
max	77.000000	1.000000	3.000000	200.000000	564.000000	1.000000	2.000000	202.000000	1.000000	6.200000	2.000000	4.000000 3.00

Figure2: Snapshot of Heart Disease dataset

Design of model:

There are two approaches to build the model in deep learning namely sequential and functional method. Here we use the functional method to build the deep neural network to identify the Heart Disease because it allows the model to share layers and to have multiple branches, inputs and outputs. The proposed DNN is built using the functional approach is shown in figure 3.
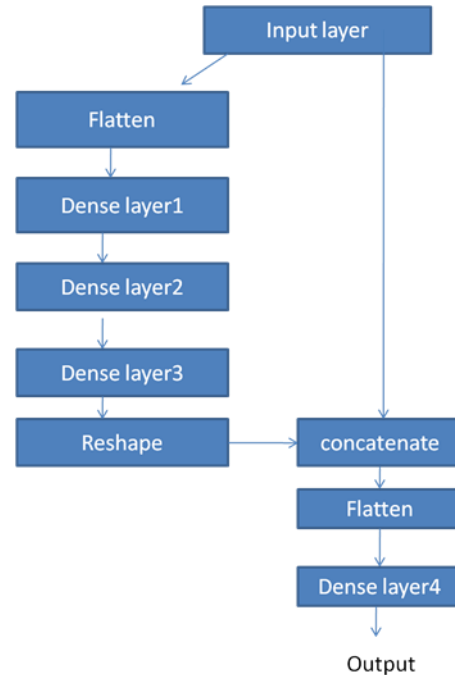

Figure 3:DNN Fuctional model

In the first input layer an input object is created. Then input objects are flattened in the flatten layer then we add multiple dense layers with activation function ReLu. Next hidden layer output is reshaped to add with input layer. To construct the output dense layer the concatenated layer is flattened. The final output layer has 15 neurons. This entire model with input and output is built in keras.

The deep learning algorithm is provided the dataset as input to generate a pipeline of input and iterators for the input. The algorithm also performs the shuffling on the dataset to generate randomness. In the next step, the training model is given input dataset using the λ function [8]. The model then does training, and testing on the datasets. At last DNN classifier is evaluated, and built using keras Tensor flow.

Results and Evaluation:

To evaluate our model a sequential model with 3 dense layer was created and we plot the learning curve of both functional and sequential models. The learning curves of functional approach and sequential approach (3-dense layers) is shown in figure4 and figure 5. From these learning curves it is evident that the functional model constructed to predict the heart disease is having lower learning rate and higher accuracy in comparison with the sequential model.
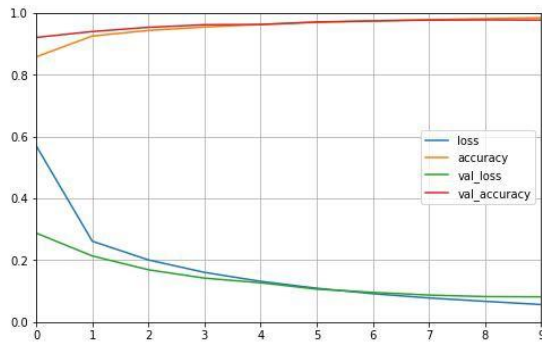
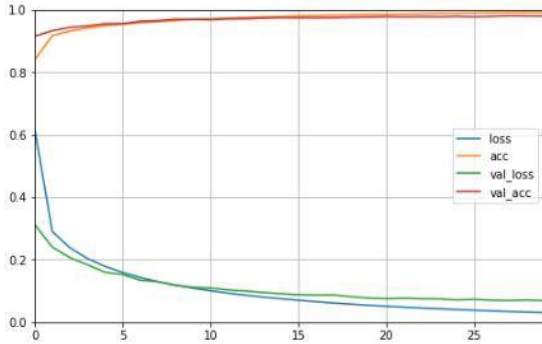Figure 4: Learning curve for Sequential approach

Figure 5: Learning curve for Functional approach

V. CONCLUSION

The evaluation results have shown that the heart disease prediction model built using functional approach of deep learning has achieved better accuracy and lower learning rates compared to sequential model. Further, the functional approach is most suitable for multiple input datasets say for example, if we need to send part of input data through the wide path and other part through the deep path and also in cases where we need to have multiple outputs.

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Visualizing the Effects of Covid-19

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Abstract- **The aim is to provide use-friendly interface/dashboard and help the world realize the economy and world disruptions. Our model visualizes the covid cases, employment rate and health case in the most substantial manner. Collecting real time data from various sources we have created a Web based Application analysing and visualizing the covid19 cases worldwide with a clear view of cases in India, which will help visualize overall cases in different countries. To represent all this data, we have utilized 3D graph view with streamlit and some other frameworks of python. We have been affected quite a lot due to the current COVID-19 pandemic over the country. However, this effect of the pandemic and its results impacted everyone in the society no matter the status.**

Keywords— COVID-19, visualize, real time data, framework.

I. INTRODUCTION

COVID-19, a type of virus called coronavirus was found first in Wuhan, China in December of 2019.The World Health Organization(WHO) declared a global pandemic because of its spread. This virus changed living conditions vastly for the entire world. This virus caused a "lockdown" restricting a lot of daily activities and living conditions and everyday life of the people.

With this view of helping the people and Government we undertook this project research to aid with the information about the spread of the pandemic in the most civilised and structured and also delivering accuracy with the data. To address this problem we have developed a covid-19 visualization dashboard, it is an interactive dashboard made in Python using streamlit framework as a backbone. The purpose of this dashboard is to provide users and enthusiasts a place where they can visualize and analyse different aspects, trends, behaviour and patterns of covid-19.

A. Page1: World Cases

This page is designed to visualize the world covid-19 patterns and conditions. This contains a World Map which displays the following cases: Confirmed, Active, Recovered and Death. Users can view per day confirmed, recovered and death cases also with drop down lists to view the top countries that have been affected by the pandemic with various patterns.

B. Page2: India Cases

This page is designed to visualize the current patterns of COVID-19 cases in India, state wise. Users can view information from the map presented. The page will contain information illustrating Total Cases, Active Cases, Cured Cases, Mortality Rate, Positive Cases, etc.

C. Page3: Health Care

This page is dedicated to the healthcare system all around India. Here, a thorough analysis on the age group details and the number of beds in all the states was carried out and then visualized using plot graphs. Displaying the current state with how the pandemic is effecting the citizens and hospitals that will provide the necessary facilities.

D. Page4: Effect on Economy

Here, we are displaying the real time data of India Unemployment Rate and state wise India Unemployment. In addition, we are presenting world Unemployment Rate and world GDP Growth. Users can also view comparison of unemployment rate between men and women.

PROPOSED SYSTEM

This system proposes to implement a dashboard that extracts secured and accurate data from trusted sources that we are relying on is the open source repository of coronavirus maintained by John Hopkins University, in addition to this the India Cases data is extracted from GitHub JSON file with real time data extraction. The information is correct, up to date and easily available. They daily aggregate data from different trusted sources are maintained as raw data and excel files.

The data is parsed into custom made functions that will change the raw data with time as well as clean the data before passing it to visualization. The columns of this dataset include the Total number of cases covering "Confirmed, Active, Recovered and Death Cases" of the covid19 patients accumulating all the states and countries, on day to day basis from 12th March 2020 to 28th October 2021. We are extracting data from the Ministry of Health and Family Welfare provided by the Indian administration for visualization of India Cases.

[1] The open source repository is maintained by John Hopkins University, it is a private research university in Baltimore, Maryland. Founded in 1876.

1. The directory is maintained by Centre for System Science and Engineering(CSSE) at John Hopkins University.
2. They daily aggregate the data from different trusted sources and maintain them into excel files.
3. The proposed system is open source.

[2] OTHER DATA SOURCES(Aggregated)
1. Ministry of Health and Family Welfare

https://www.mohfw.gov.in
2. Unemployment Rate in India
      https://unemploymentinindia.cmie.com/

After getting the appropriate and accurate data from the trusted sources the next step is to make a powerful dashboard with interactive graphs data analysis, etc.

For that we are using Python Programming Language which is a powerful language in data science and visualization, we are using streamlit which is a powerful web framework for python.

II. LITERATURE REVIEW

According to [1], for data and visualisation analysis prediction there was not a single source available. In 2021, when corona virus was declared as a global pandemic the John Hopkins University and many other websites started developing dashboards for relaying the information through the world within a month but they all were lacking accuracy in prediction using existing data. They analysed that some websites displayed countries data but those which gave the world data did not show complete information of active, cured and death. From time to time, people have tried to create interactive dashboards for visualization of covid 19 data.

A well-drawn picture visualizes information in much easier trends and relations. Since, visual presentation is a lot more advantaging of the vast, underutilised count of humans help in detecting information from pictures & visual reasoning. Data visualising focuses on graphical technology generally, with graphical entities and attributes. It's a transformation of numerical data, representing the abstract concepts as points and lines, understanding relations among numbers [2]. Computer supported visual representation of data with the techniques in the representation of graphs and charts can take the form of pie chart, bars, line graph, etc., in accordance with the data used and with easy to use drop down menus and clicks, subsuming the colours chosen with selected types of visualization. It performs a data reduction, transformation and projects the original data-set on screen in a user friendly prospective [3]. Demonstration of visualization is a related detailed framework for comprehensive design that prioritizes most specific ways in visualizing and can vastly affect end-user understandings followed by an extended view of visualization by taking into acknowledgement the knowledge aspects of design and interpretation [4]. To explore differences in skill levels, researchers plan for business students to create dashboards for executives, like and analyst. They are various software packages available for data visualizations with analytics. Creating a dashboard with a wizard, which asked to type a question entered in the input, the difficulty appeared when the labels from the spreadsheet needed to be relatively straightforward. The charts were unable to be placed sideways, and split into quarters as they couldn't hold the data [5].

COVID- Scrapper was developed as an open-source scrapping the toolset by adapting to the technology on the web to collect the process and store the records of each nation in the world to gain a comprehensive data since the John Hopkins website that provides world data lacks data comprehensiveness, including the other websites that do not portray complete data [6] . Web extraction is another name for web scraping, it is a process of accessing data from the World Wide Web (WWW) and store that into a file or database for later retrieving or analysing of it. HTTP is utilised for scrapping through a web browser [7]. Web scraper is a popular method that gathers information from the websites through internet for analytical use Using web scrapping the college university processed their pictures on the college website for students who could not attend because of the COVID-19 pandemic as a tour guide. As when the college reopen the campuses for students as they cannot visit all the colleges they apply too [8].

In our study, the COVID-19 dashboard is targeted at collecting accurate real time data records of the countries that are released from the repositories of the John Hopkins website, it subsumes global numerical data aggregated without directly accessing the medical records and visualizing the data in the most stable manner on the dashboard, it will present the data in different datasets so the information relayed is simple and easy to comprehend. We have scrapped the data from different internet sources and visualized it on the dashboard systematically. The data is complete and daily upgradation in the data describes the efficiency and accuracy in the maintenance of the respected repositories.

III. METHODOLOGY

When Coronavirus was declared publicly on a global scale, many visualization dashboards were implemented speedily. As of 2021, there are many dashboards which visualize, predicts and analyse the Covid-19 outbreak. These dashboards at presents highly focuses on the Covid-19 cases worldwide: Confirmed, recovered, mortality rates, deaths etc. There is not a single dashboard the focuses on the effects of Covid-19 around the world. These dashboards build is highly complex, dynamic and large scaled, which on the better side is extremely useful for scientists and researchers who wants to conducts studies on the pandemic. As good as these dashboards are, our aim for the project is to make a dashboard which focuses on the simplicity with data accuracy. A dashboard which will not overwhelm the normal users with basic computer operating skills.

Page1: World Cases

The data for the ongoing COVID-19 outbreak around the world is collected from [2]. The Columns of these dataset include the Confirmed, Deaths, Recovered, Active, Incident ate, Case Fatality Rate, Mortality Rate (per 100) cases of COVID-19 patients which is collected from many Countries, States and Provinces provided by their administrations on day-to-day basis.

Page2: India Case:

The data for the ongoing COVID-19 outbreak in India is collected from [3]. The Columns of these dataset include Active, Positive, Cured, Deaths, New Active, New Positive, New Cured, New Death cases of COVID-19 patients accumulating from all the states, on a day-to-day basis.

Page3: Health Care of India

For the Health Care of India, the data used is .csv files. One of which presents the Age Group Details: Columns of these dataset include Age Group, Total cases and Percentage for No. of Bed in each State the columns of these dataset include PHC (Primary Health Care), CHC (Community Health Care), SDH (Sub Health Centre), DH (District Health) and Total.

Page4: Effect on Economy

To show the World Unemployment in 2020, which covers the premise of World Unemployment between Men and Women and World Unemployment of many countries, the dataset from accordingly The data for the ongoing Unemployment Rate in India is collected from [4] from Jun 20 - May 21.

We are focused on developing a dashboard which only focuses on COVID-19 but also the economic and health care conditions around the world, since the pandemic has not only effected the citizens physically but also financially with work and housing aberrations. With our dashboard people can be aware of the conditions around them during this time of pandemic and take the necessary possible actions as soon as possible.

IV. RESULT AND DISCUSSION

The dashboard is divided into four section, each section providing different visualization and knowledge on effects of COVID-19 on different aspects of our livelihood. The divided style layout will help the user navigate through the dashboard without overwhelming. The user will be provided with detailed visualization of each page summary.

The first page, Figure1, which we have named World Cases is designed to show the detailed overview of COVID-19 outbreak around the world. At first glance we captured day to day understanding of corona virus.

Figure 1
This figure contains map overview of the world cases which displays Latitude, Longitude, confirmed cases and Death cases of the countries specified.
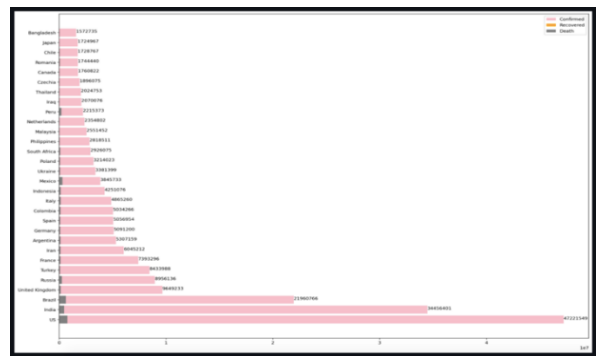

Figure 1.2
This figure shows the 3D view of USA

Figure 1.3
This figure is a horizontal bar graph of the Total countries that are specified, it is displaying confirmed and death cases of the countries.
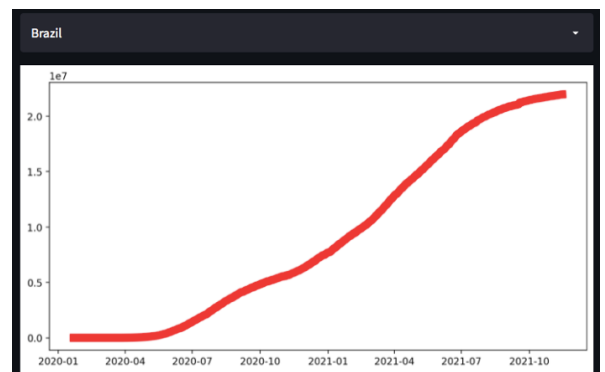

Figure 1.4
Here, in the figure, the drop down menu contains top 30 countries effected by the virus, user can view which ever country they may prefer.
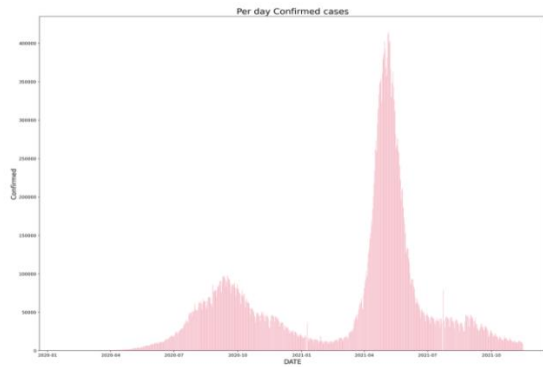
Figure 1.5
This figure shows the per day analysis of Confirmed Cases throughout the world.
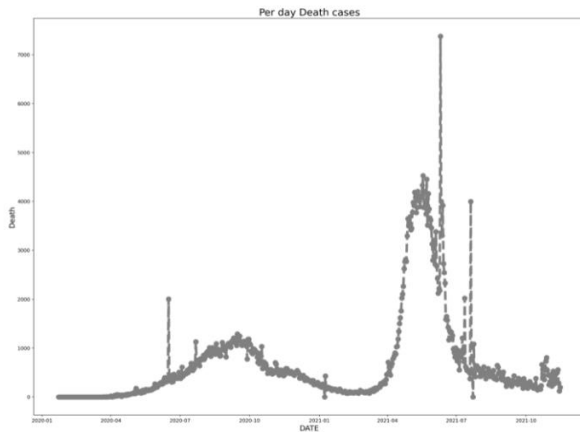

Figure 1.6
In this figure the per day analysis of Death Cases throughout the world is displayed.

Figure 1.7
The table displayed contains the data scrapped from John Hopkins website.

The second page, Figure 2, focuses on the overall COVID-19 outbreak condition in India. In this section of the dashboard we can see a map colored according to the COVID cases in different states of India.
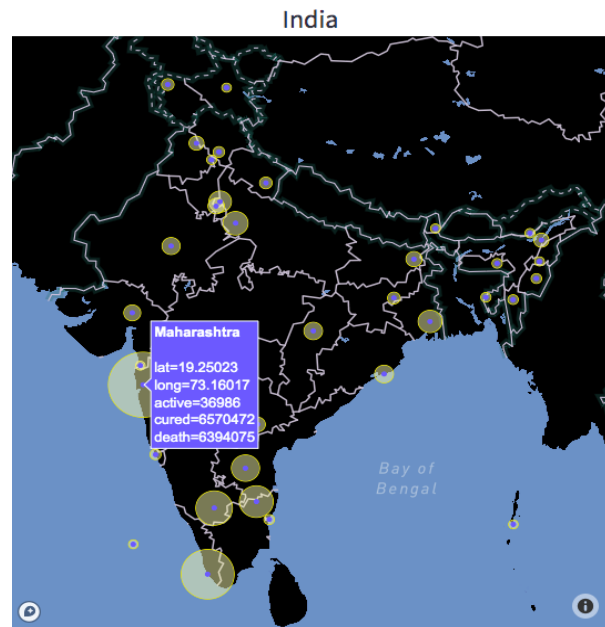

Figure 2
This is the map overview of India containing COVID cases, state wise.

	state_name	active	positive	cured	death	new_active	nev
0	Andaman and Nicobar Isl…	11	7674	7534	129	11	
1	Andhra Pradesh	3086	2069978	2052477	14415	2961	
2	Arunachal Pradesh	44	55220	54896	280	45	
3	Assam	3156	613913	604708	6049	3154	
4	Bihar	26	726156	716468	9662	23	
5	Chandigarh	27	65384	64537	820	30	
6	Chhattisgarh	237	1006358	992533	13588	255	
7	Dadra and Nagar Haveli a…	0	10682	10678	4	0	
8	Delhi	349	1440424	1414981	25094	337	
9	Goa	241	178485	174870	3374	250	

Figure 2.2
The table contains the data scrapped from the Ministry of Health and Family Welfare website for India.
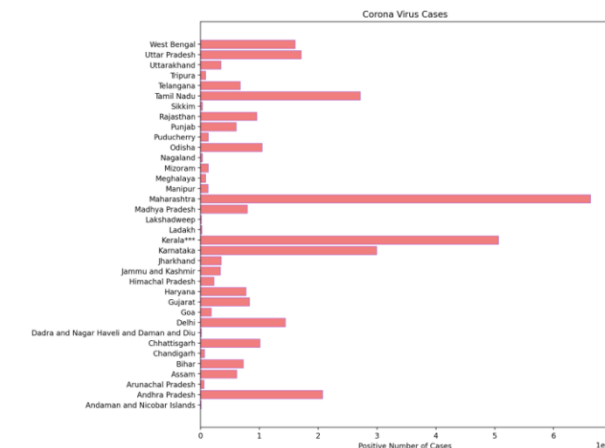

Figure 2.3
This figure contains a horizontal bar graph displaying the state wise positive cases in India.
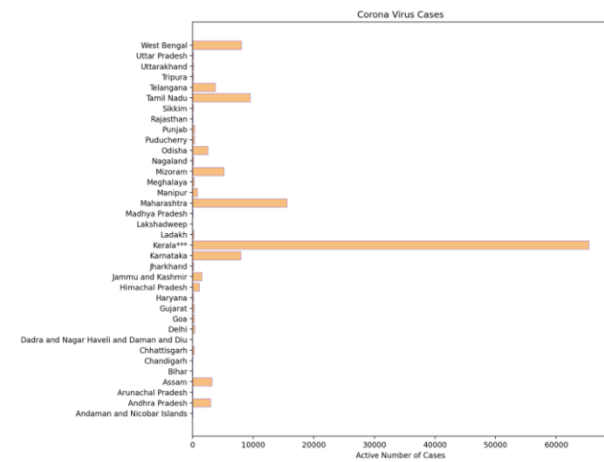
Figure 2.4
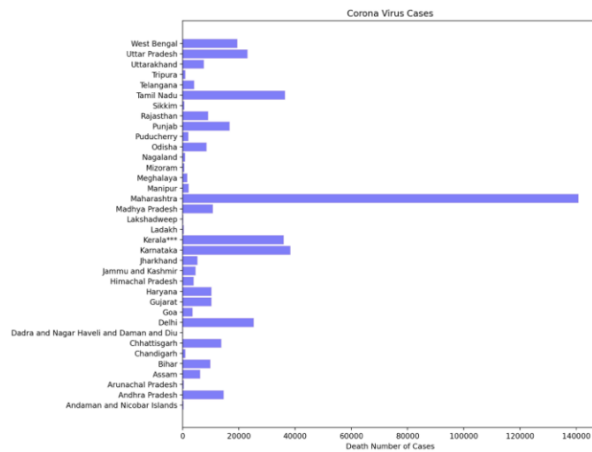This figure contains a horizontal bar graph displaying the state wise active cases in India.

Figure 2.5
This figure contains a horizontal bar graph displaying the state wise death cases in India.
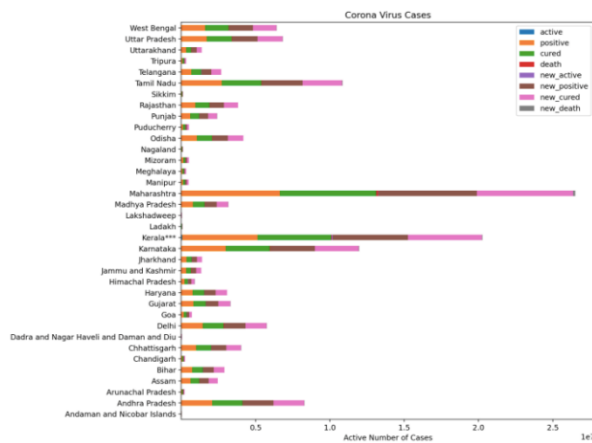
Overall Stateswise Cases

Figure 2.6
This figure displays a bar graph with overall state wise cases containing Active, Positive, Cure, Death, New Active, New Positive, New Cured and New Death cases with current active in India.

Overall Statewise Cured VS Death Cases
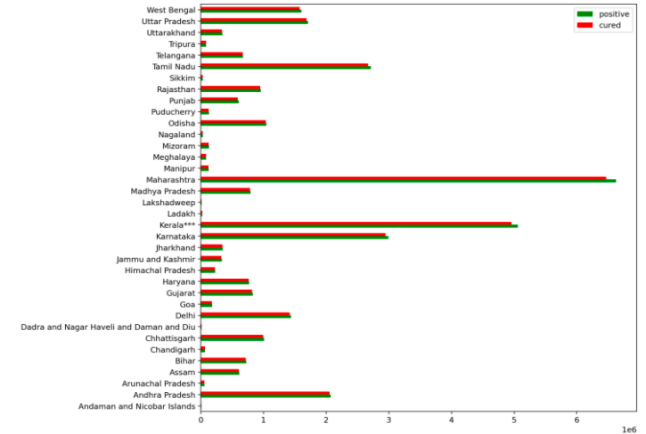
Figure 2.7
This figure displays the Positive and Cured overall cases state wise in India.

In this page, Figure 3, the healthcare system of India is monitored which shows the most effected age group demographic by the pandemic and the overall beds available state wise.
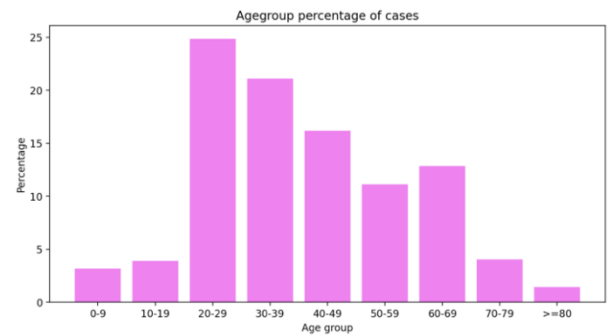

Figure 3.2
This bar graph displays the age group details that were most effected in India.

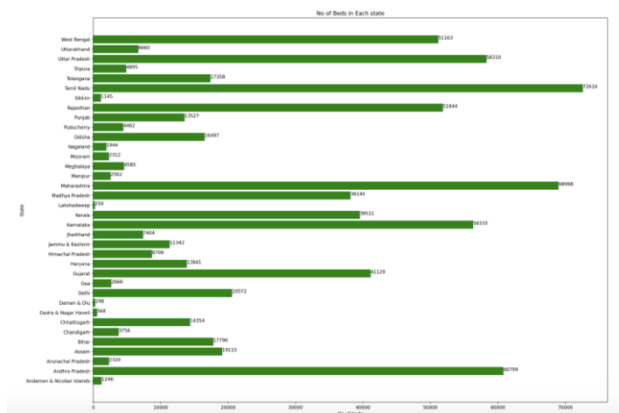## No of beds in each state

Figure 3.3
This horizontal bar graph displays state wise number of

beds available in India.

In this section, Figure 4, this page visualizes the downfall of Unemployment Rate around the World and in India. It also shows the GDP growth over the years.
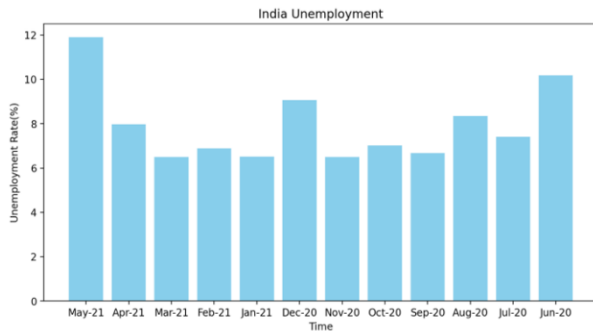

Figure 4.2
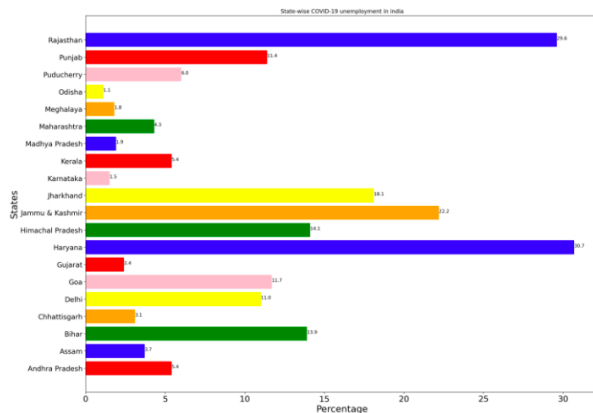This bar graph displays the Unemployment Rate of India form June-20 till May-21.

Figure 4.3
This bar graph figure shows the state wise COVID-19 Unemployment of India
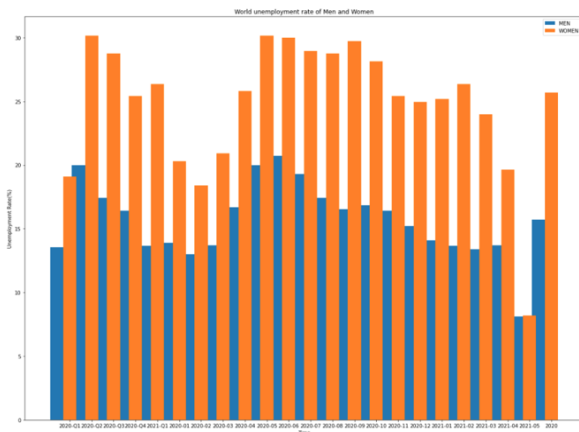
Figure 4.4
This bar graph compares the Men and Women Unemployment Rate in the World from 2020 to 2021.

Choose the country to see unemployment

select country

AUS

Figure 4.4
The figure displays a drop down menu of the Unemployment Rate in the top 30 countries that can be viewed individually in a scatter plot.
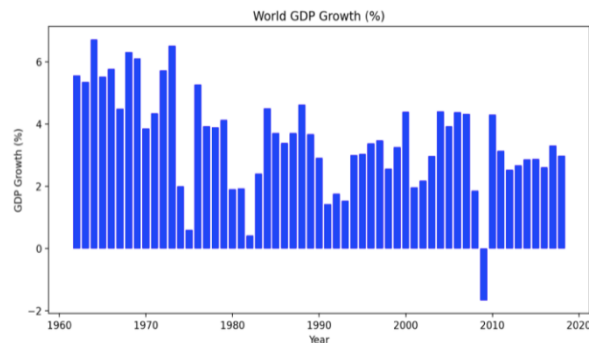
Figure 4.5
This figure displays the World GDP Growth in decades from 1960-2020

V. CONCLUSION

In this paper, we have demonstrated the casualties and analyse the current trend of the transmission of COVID-19 in the world. Demonstrating the World cases in the first page analysing the data, which presents USA some other countries that have been effected. With India's COVID-19 database, we have visualized the cases which will help the government and the citizens to ensure safety by taking precautionary measures and strengthening the medical infrastructure of India.

By observing the daily Unemployment Rate in India as well as around the World and also between men and women, we derive the conclusion how people were unemployed and especially women as compared to men. Since COVID has caused Unemployment Rate being high the World GDP has taken a serious hit in 2020 as compared to its previous years.

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Predicting Loan Approval Using ML

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Abstract—**Taking out loans from banks has become very common in today's world. Banks' main business is lending money. The primary source of benefit is the interest on the loan. However, because the bank has limited funds to distribute to a limited number of people, determining who the loan can be given to and who would be a better choice for the bank is standard procedure. Credit firms issue a loan after a lengthy period of authentication and confirmation. They are also concerned about whether the borrower will be able to repay the loan without difficulty. Many researchers have been exploring systems for determining loan acceptance in recent years. Machine learning can bring an additional reliable predictive modeling method to the banking business, which is still needed. The primary aim of this paper is to determine if a loan granted to some organization or a specific person would be accepted.**

Keywords—Classification, Exploratory Data Analysis, Loan, Loan Approval, Machine Learning, Prediction, Python.

I. INTRODUCTION

For banking institutions, loan approval is a crucial move. The loan applications were either accepted or rejected by the system. Loan recovery is a significant contributor to a bank's financial statements. Because data in banks is growing at such a rapid pace today, bankers must analyze a person's data before approving a loan. It is extremely difficult to predict whether the customer will be able to pay back the loan. Methodologies of Machine Learning (ML) are highly beneficial for determining what will happen when dealing with massive amounts of information. Machine learning assists specifically data learning from its own experiences, as well as data prediction and decision-making. The Python programming language is chosen in our research since it comes with all of the essential tools and libraries. Python is one of the most commonly used and preferred languages in Machine learning and artificial intelligence. As data is the most valuable resource on the globe, it has sparked a revolution in computer science. Machine Learning algorithms have provided numerous data analysis solutions. We would use three machine learning algorithms to predict customer loan approval: the Decision Tree algorithm, the Random Forest algorithm, and the Logistic Regression algorithm. Our primary goal is to use machine learning concepts to calculate a customer's loan status and predict an immediate and precise outcome that assists the lender in analyzing the situation, providing better services, and reducing risk by selecting the appropriate person, saving the lender time and money. We would also test various machine learning algorithms and select the best among them.

The following is a breakdown of the paper's structure: An overview of relevant Literature surveys on Research articles on Loan Prediction is included in Section II. Data Description can be found in Section III. The study's methodology for generating results is covered in Section IV. The research results are in Section V. Section VI brings the paper to a conclusion. The future work on this project is described in Section VII.

II. LITERATURE SURVEY

Rajiv Kumar and Vinod Jain, in their research paper [1] they used the Python programming language to implement the logistic tree, decision tree, and random forest algorithms. They chose the Decision tree method as the most efficient after comparing the evaluation on three kinds of machine learning approaches in terms of prediction accuracy. They didn't fill in the blanks or properly categorize the data however, this can be fixed by filling in the blanks and properly categorizing the data.

Pidikiti Supriya and Myneedi Pavani, in their research paper [2] they claim to have pre-processed the data to remove inconsistencies in the dataset. They've also compiled a list of Correlating Characteristics that were found to make people more likely to repay their debts. To divide the dataset into training and testing operations, the 80:20 rule was used. The Python platform's corplot and boxplot are used to find the correlation between attributes. However, they haven't utilized any other method to compare accuracy results other than a decision tree. This may be avoided by training datasets with multiple algorithms and comparing their efficiency.

Kumar Arun and Garg Ishan, in their research paper [3] they tested a total of six different machine learning approaches, including neural networks, support vector machines, random forests, decision trees, linear models, and Adaboost. There are four sections to this study. (i) Gathering of data (ii) Model evaluation using ML on the collected information (iii) System training using the most feasible model (iv) After the system has been trained on the most promising model, it is put to the test. R programming language was used to create this system. They didn't represent the data results for easier comprehension and comparison, but this problem can be solved by offering data visualization in the form of graphs or other matrix forms.

Authors in [4] have used the dataset from Kaggle. Initially, the information was cleansed. The next step was exploratory data analysis and feature engineering. They had done visualization through graphs. For loan prediction, four models are used. Decision Tree (DT), Naive Bayes (NB), Support Vector Machines (SVM), and Logistic Regression (LR) methods are the four methods. They determined confidently showing the Naive Bayes model is very capable of delivering superior results than other models after thoroughly studying positive attributes and constraints.

Authors in [5] said a set of data was obtained from the banking sector. The data set is in the ARFF (Attribute-Relation File Format) format, which Weka understands. The name, types of attributes, values, and data itself are all tags in an ARFF file. They used exploratory data analysis to solve the challenge of granting or rejecting loan requests, as well as short-term loan projection. In their research, they did an exploratory data analysis. For prediction, two machine learning classification models are used Decision Tree and Random Forest. In their analysis, they chose the random forest method.

III. DATA DESCRIPTION

We have got the loan data set through Kaggle [14]. The redundant and identical entries were deleted once the dataset was normalized. There is a chance that the data received possibly involve some null values, which could cause inconsistencies. Data must have been pre-processed to boost the algorithm's efficiency. Outliers must be eliminated, and variable conversion must be performed. The dataset gathered for forecasting loan default customers is divided into two groups: training and testing. Our data set includes a total of 13 columns. The response variable is Loan Status, and the remaining variables/factors determine whether the loan would be approved or not.

The characteristics are as follows:

TABLE I. LOAN PREDICTION PARAMETERS

Variable	Description	Category	Type
Loan_ID	Loan ID is unique	Qualitative	Integer
Gender	Man/ Woman	Categorical	Character
Married	Applicant married status (Y/N)	Categorical	Character
Dependents	Dependents count	Qualitative	Integer
Education	Education of the applicant	Categorical	String
Self_Employed	Self-employed person (Y/N)	Categorical	Character
ApplicantIncome	Applicants' earnings	Qualitative	Integer
CoapplicantIncome	Co-applicant's earnings	Qualitative	Integer
LoanAmount	Amount of the loan in thousands	Qualitative	Integer
Loan_Amount_Term	The loan's duration in months	Qualitative	Integer
Credit_History	Credit history complies with rules	Qualitative	Integer
Property_Area	Rural/Urban/ Semi-Urban	Categorical	String
Loan_Status	Approval of the loan (Y/N)	Categorical	Character

IV. METHODOLOGY

A. WORKING OF THE MODEL

Based on the data provided by the borrower, an organisation must automate the loan qualifying method (in real-time). Data such as Loan Amount, Gender, Marital Status, Income, Credit History, Education, Number of Dependents, and a few other details while completing a request form. As shown in Table I. To make things simple, they created a system that allows them to identify types of applicants, who are qualified for a loan amount and approach them specifically. Since we need to classify everything before determining if the loan status is Yes or No, therefore this is considered as a classification issue. The system can quickly determine if a loan application is likely to be granted or rejected. Fig. 1, shows the working of the proposed model step by step
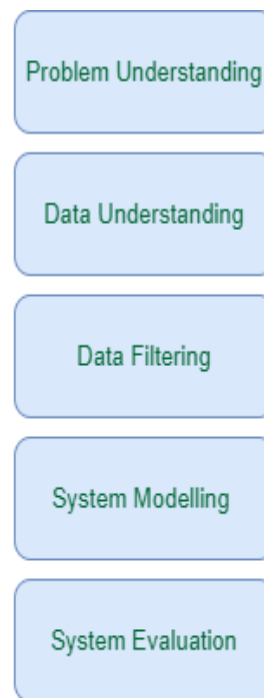

Fig. 1. Proposed model

B.   ARCHITECTURE OF PROPOSED MODEL

Our project makes use of a variety of algorithms to help us achieve a precise result. The Python programming language, which is among the most often used and popular languages in AI and ML because it comes with all of the necessary tools and libraries has been used in our project. It has several libraries, like pandas for the filtering process, matplotlib for plotting the data, data visualization, and exploratory data analysis. We have also used sklearn that is Scikit-learn which includes several clustering, regression, and classification algorithms that are commonly used in AI and machine learning. Numpy is used to deal with the multidimensional array and data structures.

Seaborn library has been used for data visualization. The model then applies this technique to pre-defined data set including all the information about our customers. In a linear pattern, the algorithms are executed one after the other. The data is then analyzed, segregated, and provided into the model to train it. As shown in Fig. 2. After each algorithm, the precision rate is displayed. We have trained our model with many algorithms to get a precise result. The Random Forest Algorithm, Decision Tree Algorithm, and Logistic Regression Algorithm will all be used, with a 70% training set and a 30% testing set. We have discovered that logic regression, decision trees, and random forests have superior precision. Following the testing procedure the model predicts if the current candidate based on the conclusion is a good candidate for getting a loan acceptance, it draws from the training data sets. As a result, the better we are in determining the capable borrower, the more beneficial it is to the organization.
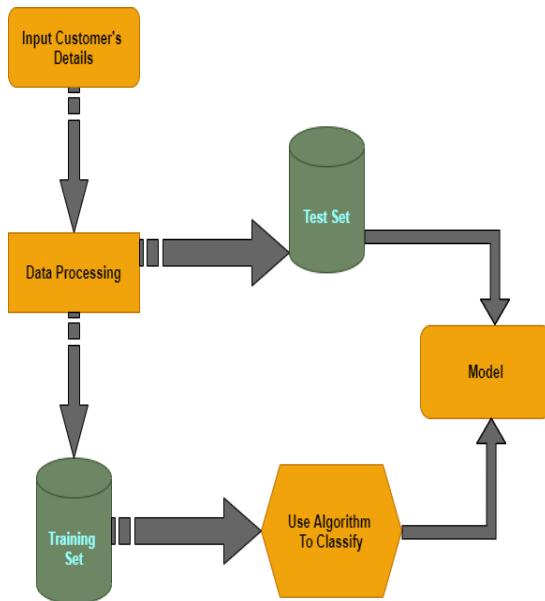

Fig.   2. The proposed model's architecture.

This design is based on the category of Supervised learning, with the classification problem. A confusion matrix is used to visualize the data. It displays the results of the prediction model that was created. The model includes a variety of graphs and diagrams that aid in visualizing the model's data flow. Each graph illustrates a collection of procedures carried out on the data set. A use case diagram 3 has been used to depict the model's operation. It defines a system's high-level functionality and scope.   The interactions between the system and its actors are also depicted in these diagrams. The properties and procedure of the model that we constructed are illustrated herein Fig. 3.
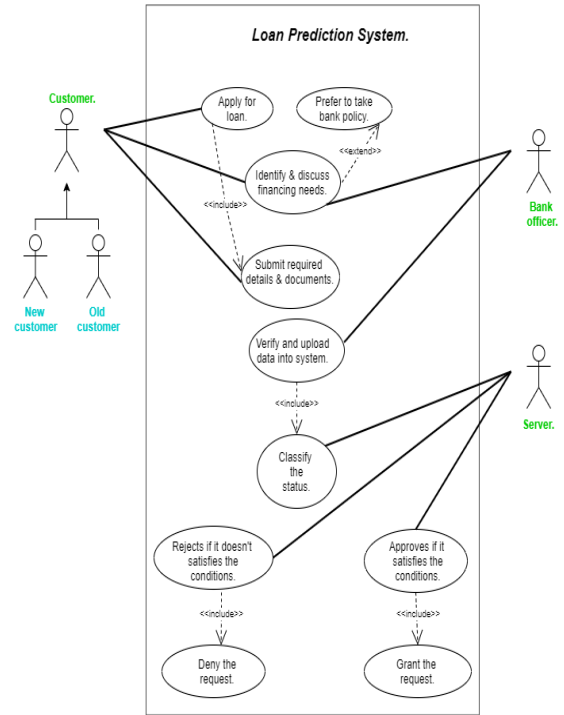
C.   ALGORITHMS

•   Decision Tree- It's a supervised non-parametric machine learning technique. It can be used for regression as well as classification. On both input and output variables, it works in categorical and continuous modes. All attributes or features must be discretized by the basic algorithm of the decision tree. The most detailed features are chosen for inclusion in the feature set. IF-THEN rules can be used to interpret the knowledge represented in a decision tree.

•   Logistic Regression- The LR approach is a popular way to solve binary classification problems. Binary LR makes use of binary dependent variables. The variables used should be relevant. Many of the model's independent variables should be self-contained. The sample size for LR should be large.

•   Random Forest- It is most commonly used in classification and regression analysis disciplines. During training, the RF algorithm builds a large number of decision trees. An approach of characterisation that involves constructing an enormous number of Decision

trees over the duration and obtaining the class that would be the mode of the classes produced by independent tree.

D. SCOPE

The scope of the project includes:

- Assists the lender in analyzing the situation.
- Gives better services for use.
- Reduce the risk factor by choosing the right person.
- Save time and money for the lender.

V. RESULTS

To acquire an accurate result, we used a variety of strategies to train our model. With a 30 percent testing set and 70 percent training set, Logistic Regression Algorithm, the Decision Tree Algorithm, and Random Forest Algorithm were implemented. Logistic regression, on the other hand, has the highest accuracy of all the algorithms.

Fig. 4. Rejected state.

Fig. 4, after giving the input we can see the loan status as rejected. As the customer was not eligible.

In Fig. 5, after giving the input we can see the loan status as accepted. Because the customer was an eligible candidate.

Our model has a prediction accuracy of 82.70 %, indicating that it can predict defaulters. A heatmap was used to analyses everything. The correlation matrix is represented visually as a heatmap. It aids in the speedy identification and verification of relationships between columns.

TABLE II. CONFUSION MATRIX

	Predicted No:	Predicted Yes:	
Actual No:	22	29	51
Actual Yes:	3	131	134
	25	160	

$$Accuracy = \frac{TP + TN}{TP + TN + FN + FP} = \frac{131 + 22}{131 + 22 + 3 + 29} = 0.827027$$

VI. CONCLUSION

TABLE III. ACCURACY TABLE

Algorithms	Accuracy
Decision tree	75.675 %
Random forest	80.000 %
Logistic regression	82.703 %

This system would be able to determine the status of the loan whether it would get approved or denied swiftly in real-time. Displays accuracy with various algorithms. We have compared the Logistic regression algorithm to two other algorithms, random forest, and decision tree Table III. However, of all the algorithms, Logistic regression has the highest accuracy. Also, it can fill the missing values of the datasets, treat categorical values, scalability problems, overfitting problems, and provide a good visualization of the data using a confusion matrix.

Applicants who have a poor credit history are likely to be rejected, especially to the risk of not repaying the loan. Applicants with high income who request low-interest loans have a stronger chance of being accepted, which is logical because they have a strong chance to repay their debts. Few essential characteristics, such as marital status and gender, appear to be overlooked by the organization, but the number of dependents is taken into consideration.

VII. FUTURE WORK

The libraries are used professionally and are sufficient for now because we chose the Python programming language, but many aspects require additional exploration. Many areas of our project are left unexplored and might be studied and explored further.

For further research, applicants' Age, past health records, as well as the type of occupation they have will

be utilized to evaluate the ambiguity factor of paying debts, and possible defaults of corporate loans for businesses and startups can be forecasted. Another method could be developed to forecast defaulters on different types of loans as well. We used a medium-sized data set to train our model, which may have influenced the outcome; therefore, a big and well-defined data set is required for more accurate results.

This paperwork could be expanded to a higher level in the future, allowing the software to be improved to make it more dependable, secure, and accurate. The system has been trained using current data sets that may become older in the future, allowing it to participate in fresh testing to pass new test cases.

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Planning, Developing and Testing the Learner's Centric MOOCs (LCM)

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Abstract- **The term 'MOOCs' represents open access, global, free, video-based instructional content, videos, hassle units and boards released through an online platform to excessive extent individuals aiming to take a route or to be educated. These online courses respect certain technical specifications and follow characteristics like they leverage web formats which are collaborative, contain evaluation modules, and are limited in time. Programming Language that has been used are JavaScript, PHP along with MySQL as database, and the system can be operated in any browser Google Chrome, Mozilla Firefox etc. Present system faces lack of technological infrastructure, investment, diversified population and quality of courses. This paper focuses on the usage of MOOCs as an e-Learning open training platform that permits the customers to take part with no cost, besides spatial or temporal limitations, in on line publications by using the net and also helps the school in making command on new strategies to plan course.**

Keywords- massive open online course (MOOCs), xMOOC, Pedagogy, Digital Gap, Limitations.

I. INTRODUCTION

1.1 Background
With the assist of the development of web technology and the diffusion of IT infrastructure, a newly fashioned kind of e-Learning platform draws international attention, in that it makes use of IT assets to assist facilitate students and college members in education **[1]**. This kind of e-Learning device indicates a big amount of difference than the usual school room style training due to the fact it allows newcomers to overcome the spatial, temporal and environmental limits. For example, MOOCs are accessible on-line at any time, regardless of the daily existence hours, which implies that students can get right of entry to all the course materials different than the reputable school hours.

1.2 Problem Statement

The main intention behind developing the application is to provide e-learning services and identifying the gaps emerging in implementing MOOCs. The main problem is limited internet connectivity and slow internet services, the design of the application is not proper and various standards need to be set for quality course **[2]**.
The quality of content, evaluation, learning results, lack of feedback, among other things, has been called into question. The participative experiences on various courses of the major MOOC platforms, with the aim of demonstrating the principal problems and challenges of

MOOCs, how these could be overcome from a teaching, technological and organizational perspective; in such a way that in the future, this teaching modality could contribute much more and strengthen this form of inclusive education.

1.3 Objectives
a) The main objective is to make the application easily reachable to every person and so that every student is motivated to complete the course, providing quality content.

b) The aim is to provide a personalized learning experience to the students. Focus was placed on what topic is important for the student, not on what are the important topics.

c) A course providing same content to all, but reviewing everyone individually according to one's strengths and weaknesses.

d) The gaps will be filled by building a bridge for the learners and the teachers to learn and teach. With the use of this application, general teaching can give personalized results.

II. RELATED WORK
To create a MOOC which would help the students have a personalized learning experience, some of the famous MOOC applications were reviewed. The common features were listed down and gaps were considered from these MOOCs for better result. Below are some of the mentioned MOOC applications we reviewed:

A. Coursera
Coursera have scholar dialogue forums, homework/assignments, and online quizzes or exams. Generally speaking, Coursera guides are free to audit (i.e. watch videos) but if you want to earn a route Certificate, you will need to pay.

B. edX
Open edX platform is the open-source platform software program developed with the aid of edX and made freely available to different institutions of greater getting to know that prefer to make comparable offerings. The Open edX server-side software is almost completely based on "Python, with Django as the web software framework

C. Swayam
The GUI of the application also plays a major role in the learning of the users.The use of C and C++ in frontend ,Django for framework ,as it need a huge database to handle data warehousing and for transactions it uses oracle C and C++ helps swayam with fast processing the system

III. LITERATURE SURVEY

Table 1 **Literature review of 12 papers studied on MOOCs**

Ref No	Name of authors	Title of paper (year)	Methodology used	Key findings	Research gaps
[1]	Grainne Conole University of leicester	Moocs as disruptive technologies: strategies for enhancing the learner experience and quality of MOOCs (2013 RED - Revista de Education a DistanceNumero)	Study by analysis , design framework and key characteristic.	a)Use of to technology interact with multimedia. b)Organization of meet ups by participants c)Assignment rating d)Application for badges. e)Course map	a)Bad design. b)teachers lack the skills needed to harness the power of new technologies c)Workload problem d)Knowledge recall to development of skills
[2]	Hsiu-Mei Huang	Constructivism for adult learner in online learning environment Year: 2002	demonstrating their real value in specific implementation and within institutional strategies.	a) Upload required material. b)learner-centred and collaborative environments. c)Involve high order thinking skills .	e)Individual learning objectives f)Questionable course qualit y g)Unavailable course credits
[3]	Olaf zawaki-Richter, ArazBozkunt	International review of research in open and distributed learning. Vol19 FEB -2018	Screening, sampling analysing and interrupting synthesis of findings and on the basis of that they made the graph as per frequency.	a)Understand the potential of the students. b)Easy format. c) the learners can access the material whenever they want d)Easy moderate tough levels	
[4]	Sahana Murthy	LCM model for planning designing and conducting MOOCS Mumbai 2016	They focused on verbal lecture printed handouts drill and exercise sessions structured classroom activities.	a)Learner centric principles b) figure things out for themselves. c)express their opinions and learn from their peers.	a)Rarely critically reviewed questions b)Divergent, ill-structured solutions. c)Proper Challenges should be created with advancing of learners knowledge d)expert feedback to learners
[5]	1]Andrew adams 2]Tharindu .r .liyanaguna ward ena 3]Shirley ann William	MOOCs : a systematic study of the published literature 2008-2012 (15 july 2015)	Media , blogs specialist amd popular press were studied.	a)Access the material directly b)Own blog posts c)Online surveys d) mobile devices to access the course e)exploring the strategies used by students who continue to be active.	
[6]	AnoushMar gary an*, Manuela Bianco, Allison	Instructional quality of Massive Open Online Courses (MOOCs) Year: 2015	Constructive, authentic learning, cognitive appurtenance to solve	a)Assessment of quality and presentation course b)Learners activate existing	

	Littlejohn		problems .	knowledge and skill. c) Wide range of real-world problems.	
[7]	Katy Jordan	Massive open online course completion rates revised. June 2015	Quiz ,interactive sessions project based learning and problem based learning.	a)Voluntary participation b)AI-Stanford courses have more approach	a)factors determine dropo ut b)Passive declarative elements and interactive
[8]	Kenneth R. Koedinger, Elizabeth A. Jihee Kim, McLaughlin	Learning is Not a Spectator Sport: Doing is Better than Watching for Learning from a MOOC Year: 2015	Features and design Using passive and declarative information and use of active and interactive activites. While learning benefits of the use of informational assets.	a)Passive and declarative method and interactive sessions b)OLI materials c) Feedback targeted to diagnose misconceptions d)online and offline homework assignments e)Time analysis	problem-solving elements. c)Making revision videos of short length. d)supportive to the students own skills and knowledge.
[9]	Little John	Learning in MOOCS: Motivation and self regulated learning in MOOCSDec 2015	Records and SRL	a)Analysis of datafor intrest of students. b)Learner's with high SRL scores.	
[10]	Maha Bali Associate professor of practice center for learning and teaching the American university in cario Carioegypt	MOOC pedagogy: gleaning good practice from existing MOOCs. (March 2014)	Evaluation by studying 4 different courses.	a) Social media use b)Web-based conferencing c)Reflective assignments d)Student–student interaction e)Quizzes tested understanding and application f)Feedback to students by others g)Optional readings free resources. h)Encouraging course completion and deep, critical learning. i)Comfort learners	a)Lack of back-and-forth possibilities b)False strategy to increase course completion rates. c)unlikely to promote deep learning.
[11]	Aras Bozkurt NilgunOzda mar Keskin Inge de Waard	Research Trends in Massive Open Online Course (MOOC) Theses and Dissertations	The primary data collection methods were surveys, platform database analysis, and interviews.	a) Engagement and Creativity b) growth of learning analytics and assessment c) social network analysis, user logs, internet and traffic ranks d)Data Collection and data analysis	
[12]	Ana Ibanez Moreno	MALL-Based MOOCs for language	MALL (Mobile Assisted Language Learning)	a)A mix of MALL,MOOC and CPD programs for	a)Space limitations b)Linguistic

UNED John Traxler University of Wolverhampton, UK	teachers:Challenges and opportunities (December 2016)	for language teachers within CPD (Continous Professional Development), which include technical ,pedalogical and linguistic standards.	teachers b)Deliver practical guidelines, exemplars and standards c)Extensions of human cognition, senses, and memory. d)Flexible, open, collaborative, participative, safe space e)Guidelines to implement mobile devices.	portfolio c)mobile-enabled language ,not engaging ways of delivering language	

IV. PROBLEM DEFINITION

a) Better kind of metrics need to be developed to understand the way in which learners are interacting with MOOCs.

b) MOOCS need to overcome such as questionable course quality like it should be related to the proper syllabus and the level should be there according to the students understanding.

c) There are high dropout rates of students for the courses so that should be focused, unavailable course credits there should be related courses according to students interest, ineffective assessments, complex copyright issues and lack of necessary hardware required to join MOOCS.

d) It is possible that in order to enlarge path completion rates, the instructors of some MOOCs pick out to simplify their assessments and to hold their courses flexible. This, however, compromises the perceived "quality" of gaining knowledge of implied by using a "Statement of Accomplishment" in these courses.

e) A course that tests learning only through quizzes is unlikely to promote deep learning.

f) If instructors continue to plan MOOCs as they would plan their everyday F2F courses, or even non-massive/non-open online courses, they fail to maximize practicable studying for the biggest quantity of students, due to the fact it means they are now not putting the college students at the centre of the gaining knowledge of experience [3].

V. PROBLEM DEFINITION

5.1 Research Methodology

This find out about was once carried out through evaluating on different courses and papers. The assessment and overview of exceptional MOOCs were carried out to glean some top pedagogical practices in MOOCs and areas for improvement. it used to be found that every path had similar characteristics however they are no longer supplied in precisely the same way, some supply more sound pedagogy that develops greater order thinking, whereas others do not. Features and design the usage of passive and declarative statistics and use of lively and interactive activities [4]. While the most popularized element of today's MOOCs are the video lectures, many MOOCs also include interactive activities that could afford learning by doing. In our future research, MOOC Platforms will be divided into categories by analysing the features of each online educational platform, also covering the topics on the attributes that distinguish MOOC from existing education systems as depicted in Figure 1.
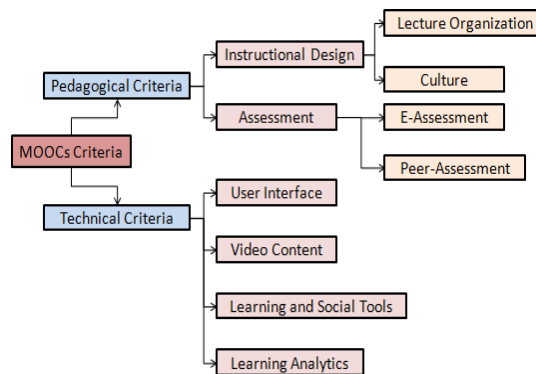

Figure 1 Classification of the MOOCs criteria important for user's learning.

5.2 Application Modules

System design for the MOOC application was created using the architectural details required to build an application[5]. The steps/activities used in the design of the system are listed below:

a) Partition the evaluation model into subsystems.

b) Identify concurrency that is dictated by way of the problem.

c) Allocate subsystems to processors and tasks.

d) Develop a design for the user interface.

e) Choose a simple strategy for imposing information management.

f) Identify world sources and the manage mechanisms required to access them.

g) Design an appropriate control mechanism for the system, including result and assignment management.

h) Consider how boundary conditions should be handled.

i) Review and reflect on consideration on trade-offs.

VI. METHODOLOGY

6.1 Working (Coding Modules).

6.1.1 Student Portal

a) Firstly, the student logs in the application. (Their details shall be cross checked from the database and on successful login, they shall be able to see their resources.). If they are a new user, they go for sign up, and then log in. Next, they enter a few details to set up their profile.

b) The student is then shown a collection of topics they might be interested in. They are then recommended some courses related to the topic.

c) For the next step, they have to enrol for a course they wish to study, and start going through its study material. During this time the activity of the student shall be monitored. For e.g., how many times did they have to review a particular video, how long did they stay on a particular documentation, at what time do they usually refer the modules, etc.

d) The system shall also collect the last activity of the user before their session expires so that they can continue back from where they had left their modules.

e) At the end of each course, there shall be a final quiz/project which the student shall have to submit in order to qualify for the certification. There shall be a required passing mark to maintain the study decorum. These marks shall also play a crucial role in their final report. The number of times they attempt the quiz/project shall also be noted to help them identify their previous mistakes **[6]**.
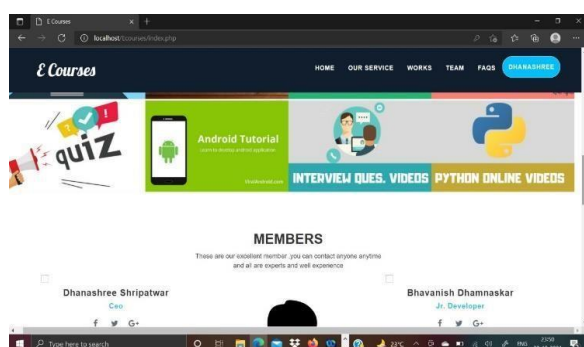

Figure 2 **Screen visible after student login**

6.1.2   Faculty Portal

a)   Similar to the student, the faculty will need to login in the application. If they are new, they shall have to sign up first.

b)   Then the faculty will need to fill out some necessary details in order to upload a course.

c)   The faculty can then start uploading courses and its materials. The faculty shall be using online tools in order to evaluate the projects and assignments of the students. Each faculty shall be notified about students who are lacking in some areas of the course.

d)   The faculties can then arrange for some measures in order to help the students who are lagging behind in the course.

e)   The faculty would be able to learn new technologies and skills , to implement the same while building course for the students.

f)   The faculties shall also have access to discussion forums, and will be provided with options to delete or hide inappropriate discussions **[7]**.

6.1.3   Admin Portal

The admin shall be given access to all the course materials uploaded and their discussion forums. They can remove anything unnecessary after thorough reasoning. They will also maintain the security of the system in order to ensure no user is being given unfair access to courses, no one is hacking, no one uploads anything inappropriate. They shall also look after the data base, and fetch results for queries which might turn to be useful for the future scope of the MOOC.
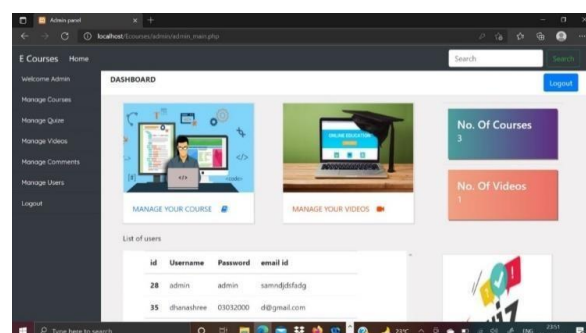

Figure 3 **Shows admin dashboard**

VII.   SYSTEM REQUIREMENTS

The following are the desired functionality of the new system: The system can authenticate the users of the system as shown in Figure 4.
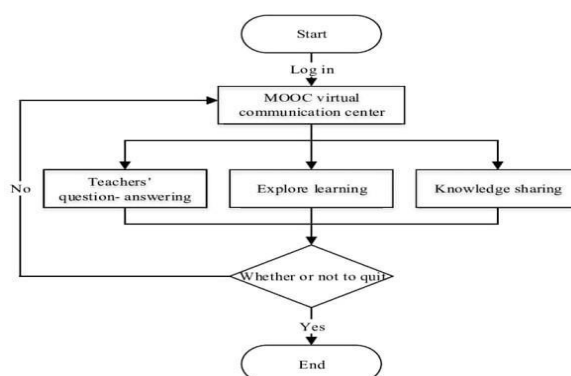

Figure 4 Flow of modules of MOOC after successful login

The users can study courses online/ offline, using the system, take exams and be eligible for certification. The system generates a full- fledged report for the user, including their area of weaknesses, their strengths, their growth development chart, their activity status and their achievements, as shown in Figure 5.
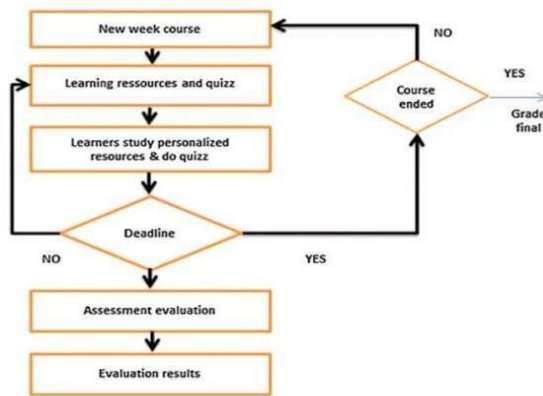
Figure 5 **Flow diagram of a course from enrollment till completion**

The system collects all the activity of the users including the number of times they viewed a particular video, their last activity, their test scores and much more. The system shows recommendations of new courses based on the user's self-report. The system manages and control ethics in the discussion forums **[8]**.

7.2   Software Requirements

Front end: HTML (Hypertext mark-up language) allows the development of an easy and intuitive consumer interface for accessing the database and any browser can show an html document. CSS (Cascaded Style Sheets) are used to design these interfaces to make them look attractive and create a complete User- Friendly GUI.

Middle end: JavaScript is used to Validate forms and control some functionality in the front end of the design. Then the use of PHP to connect the front end of the system to the Database (In our case, MYSQL).

Back end: MYSQL is super for transactional retail outlets the area normal overall performance is a concern. It's additionally exceptional when the statistics form is going to evolve over time, as its schema-less operations enable you to replace the facts on the fly. MOOCs are getting the eye of engineers and researchers, and they help in developing a helpful system for the learners. This paper demonstrates an application-based on e-learning Participant's motivation to be a part of MOOC falls under three categories –Fulfilling modern needs, making ready for the future and Satisfying curiosity. Figure 6 and Figure 7 shows the GUI of the homepage **[9]**.
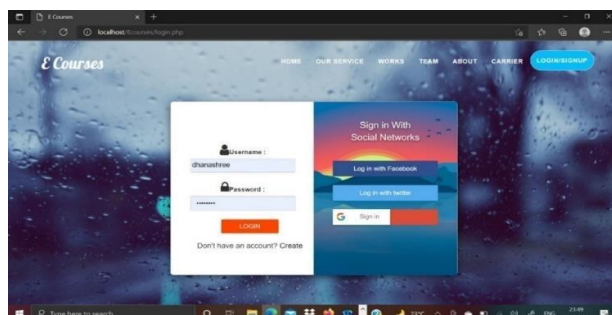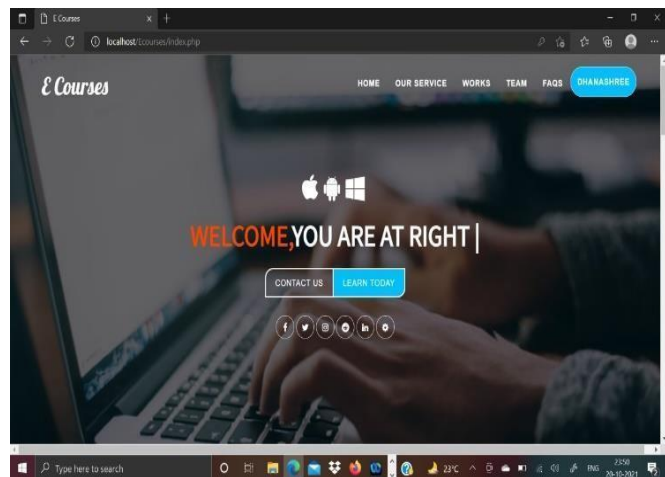

Figure 6 **Home Page of the MOOC application**

Figure 7 **NodeJS code used to run the Home Page**

7.3   System Requirements

A.   Hardware

8 GB RAM

3.5 Ghz Clock speed 512 GB HDD/SSD

Display (Any Monitor would serve)

B.   Software

Scripting Languages – HTML, CSS, JavaScript Programming Language - PHP

Database Language – MySQL (phpMyAdmin) Runtime Environment – Xampp Server Operating System - Windows 8 and above

Web Browser - Anyone from: Google Chrome, Mozilla Firefox, Internet Explorer, etc.

VIII.   RESULTS AND DISCUSSION

8.1   System implementation and testing

The system can be implemented as a standalone and serve as an excellent MOOC platform across nations **[10]**.

8.2   System design

A.   Input Design

Input sketch is a part of normal machine design, requires the very cautious comparison of the enter statistics items. The intention of the enter format is to make the statistics entry easier, logical and free from errors The well-designed, well-organized display codecs are used to gather the inputs. The data standard is stored on database file.

B.   Output Design

Output is the most important and direct source of information to the user. Efficient & intelligent output design improves the system relationships with the users and helps in decision-making. The output is collected in order to help the user to make a wise decision. The best output is the one which takes minimum input entered by user and produces a full-fledged report form output **[11]**.

C.   Database Design

Since lot of the data mentioned in the MOOCs is personalized and does not follow a specific format for the data being collected, we decided to use a NoSQL database. The data is stored in form of documents, where each record is a document and the records can differ from each other with one or more attributes. Since our MOOC provides courses to all students of all the streams,
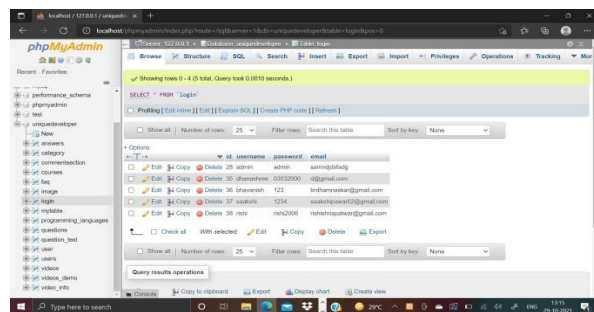
Science, Commerce and Arts, data collected and stored can differ from one other entirely and started working with the MongoDB database. MongoDB is very helpful as middle end programming is done on Nodejs, and since these both are compatible, this was the best fit. Figures 8,9 and 10 show few of the collections implemented in the MOOC system.

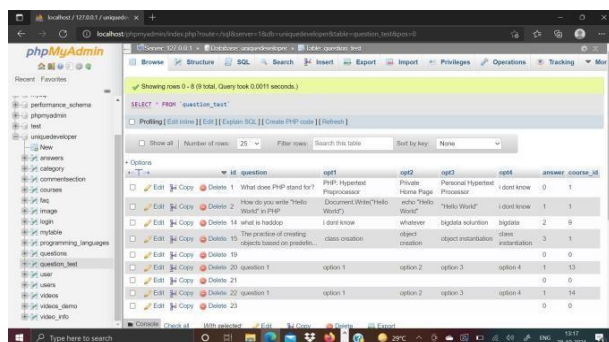**Figure 8** Database of the details of the user's login.

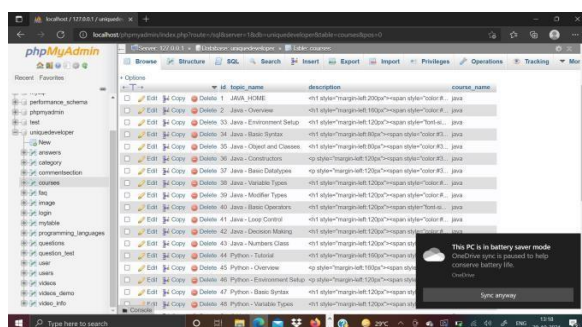Figure 9 **Database of the questions added by the faculty.**

Figure 10 **Database of the topics added in courses.**

IX. CONCLUSION

In some approaches the benefit of MOOCS lies now not in the way they are designed nor in what the trainer

assigns individuals however as a substitute in the spaces for engagement made viable with the aid of the course. It lies in the flexibility of pathways and alternatives for lifelong learning. A teacher wishes to advance imperative wondering or to promote interaction amongst students. MYSQL database is used as, it is very helpful as we were going to use PHP for middle end programming. The construction and designing part of Front end is done with HTML and CSS JavaScript is used to Validate forms and control some functionality in the front end of the design. MOOCS is generally designed to stimulate young minds into being autonomous and motivated enough. As the body of academic literature related to MOOCs grows, the practicable for more exact and sturdy meta-analysis is possibly to enlarge in the future **[12]**.

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Link for Survey conducted via Google form and its results. Form:

[13] https://forms.gle/iSsqwtZwnZxnk6aL6 Results:

[14] https://docs.google.com/spreadsheets/d/1pgfWABZzmonmctV 6jvyznSYfeRtsthk64ijGiHVfDJw/edit?usp=sharing