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ANALYSING THE IMPLICATION OF MODIFIED MICRO-INTERACTIONS TO OPTIMIZE THE OPERATIONS OF SOCIAL MEDIA HANDLE - WHATSAPP

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Mrs. Sudeshna Roy**

ABSTRACT

Along with the development of technology and creativity, there are several trends in UI/UX that are being improvised day by day. In the same context the improvisation is also much needed for refining the UI as well as UX of any already existing application?WhatsApp Messenger is a messaging service using Voice over IP, allowing users to send ordinary text messages, transmit voice messages, make audio and video calls, and share images, documents, user locations, and other media. This messenger has continuously tried to improve, motivate as well as grab the attention of entire social communities.

Nowadays, there are many UI trends that are coming into existence, which can be used on our currently used application for better UI as well as UX. Hence, there could be a scope of redesigning the already existing Whatsapp also to make it more worthy for the end user and also enriches the user's experience during its application. In this article an honest attempt has been made to redesign the already prevalent version of Whatsapp Messenger and the user experience and acceptance of the changed interface has been analysed. UI redesigning is done using the principles of UI design, Material Design Guidelines and Ten Heuristics of User Interface Design [2].

***Keywords**:UserInterface (UI), User Experience (UX), Redesign, WhatsApp, Material Design.*

I. INTRODUCTION

Social media is a powerful tool which is a computer aided technology widely used to enable the exchange of information, thoughts and ideas virtually over the network. WhatsApp is such an example of a social media tool which is a popular mobile application for providing instant messaging service. It requires internet service to communicate various types of text and multimedia messages between users or groups. It is such a popular tool that the total number of users have crossed one billion figures in the month of February 2016 as specified in [4], also almost 2 billion people across 180 countries stay connected with their people immaterial of time and place. It is also becoming a popular tool for marketing in businesses and publicity in politics. In a very short span of time the users of almost all prevalent social networking sites have shifted to Whatsapp. With this product people are able to communicate anywhere in the world without any limitation. Hence, there comes the role of User Experience in blocking those barriers which enable users to interact with others.

But can WhatsApp be more improvised with respect to User Experience? Can WhatsApp be more efficient in handling user's attention? Yes, it could be! Initially after going through the

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application, users are relaxed for a while, but when they spend a pair of hours they get bored due to clicks and repeatedly going through the same flow. To emphasize more on this, for instance, if any user wants to change his/her profile information, the user has to go to the three dots Menu at the top-right side, then select Settings and then finally select Profile option. The same process has to be followed in case of changing profile picture as well. So users after sometime experience setting profile picture or information a bit lengthy so they might not feel convenient to repeat the same in near future. Similarly, there are few other features in this social networking tool such as making audio calls, video calls, sharing live locations whose accessibility to the users can be made convenient by changing the micro interactions in the existing UI/UX .

So for better look and feel, we tried to adapt new trend of UI i.e. Skeuomorphism/Neomorphism and improvised user experiences limited to some functionalities. We researched the usage of the redesigned WhatsApp version; we performed an internet based survey using open-source Google Forms and obtained responses.

II. DESIGN

In the current scenario of pandemic across the globe, the world is completely transforming itself into the digital space. Social Media handles are one such technology which is widely and effectively used by the people to communicate, perform business and exchange information through a digital platform. To make this process more efficient and make the experience of using the platforms convenient and hassle free, this paper demonstrates the effort of re-designing and representing the existing and most widely used handle Whatsapp Messenger with the latest UI trends. The User Interface has been designed using Adobe XD. It is software which provides a vector based user experience for mobile applications as well as web-based applications. A prototype has been developed for the proposed digital application, wherein several screens have been designed to test the users experience with it.

Micro interactions are a single petite piece of functionality which has the capability of performing any task. The design concentrates on such nimble micro interactions to make the use of the application more pleasurable and engaging. To increase the usability and speed of accessing the options such as finding the Setting, Whatsapp Web and starred images directional navigation access is provided as can be seen in Fig. 2.3. The main screen where the users shall be landing, care has been taken to provide some of the vital operations on their fingertips. The swipe feature augmented to the profile picture adds more smoothness to the crucial operations as seen in Fig 2.4. The idea behind this social media tool is predominantly to connect with people for varied official or personal needs. Actors might require interacting with other actors via audio and video call which has been made easily accessible. The idea of having an operation which allows the users to spontaneously identify the physical location of any person in their contact may boost the confidence level of the users. This is also added to the swipe feature. The power of micro interaction has been realised by easing the users to edit with their profile information. Although, this would seem as an insignificant task, but to interact with people the impetus is always generated through one's profile information. To significantly transform the ease of accessibility of this feature just one-click on the profile picture leads to the page for editing the profile! The potentiality of UI unleashed in this feature is thought provoking as to how impactful this could be. Fig. 2.5 illustrates the same. Floating Action Button is another element commonly used in UX design which enhances and acts as a path finder to applications to guide the user to make out

what to do next. Floating Action Button along with animation is used in designing to guide the users to add user, group and broadcast as shown in Fig. 2.6.

Following are the screens designed for the proposed version of WhatsApp UI.

Fig. 2.1: Splash Screen of Proposed Whatsapp UI

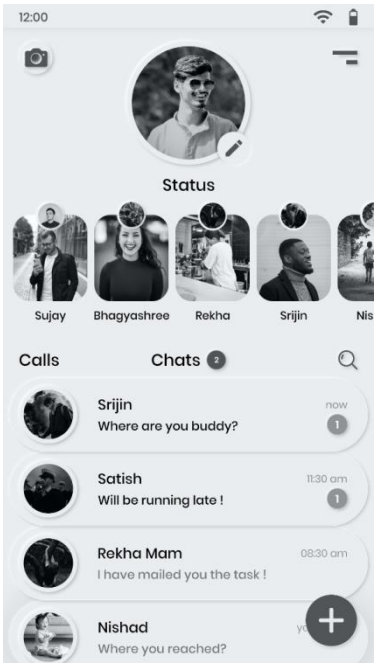

Fig. 2.2: Main Landing Screen

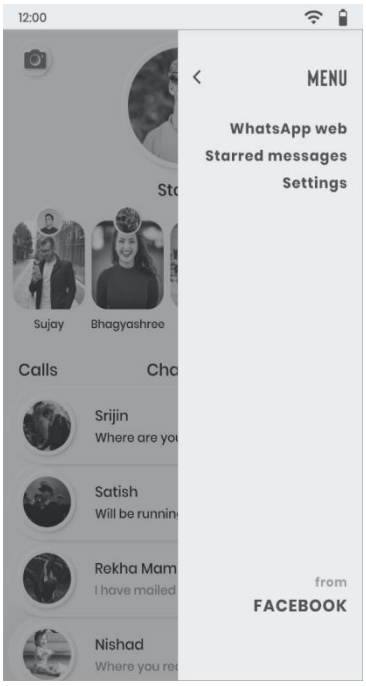

Fig2.3: Navigation Menu displaying options after clicking on Hamburger

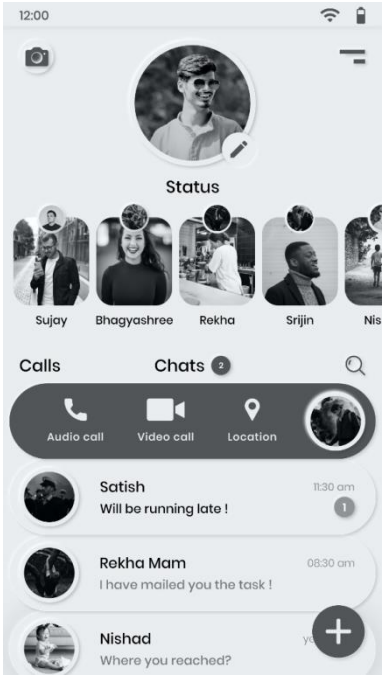

Fig. 2.4: Accessibility options displayed after dragging profile picture to the right

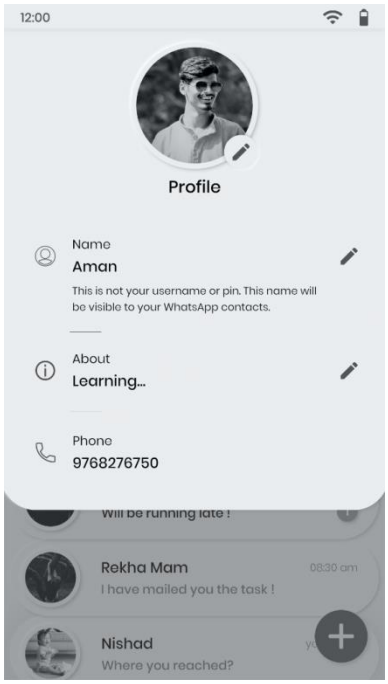

Fig. 2.5: Edit Profile Info options displayed after clicking on Profile picture

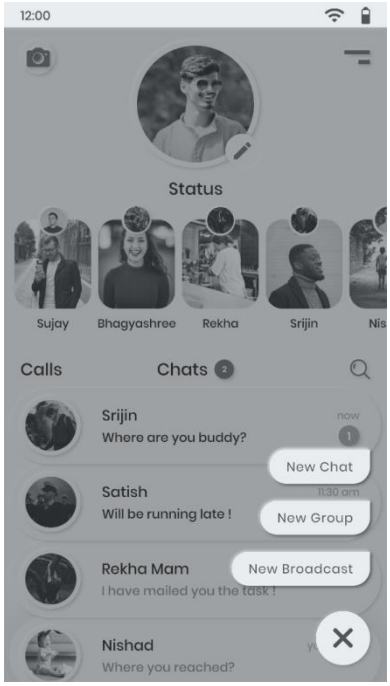

Fig. 2.6: Options displayed for NEW, after clicking on FAB (+)

III. SURVEY

To understand the efficiency and acceptability of the proposed UI/UX design a survey was conducted roughly on around 60 people across all regions and age groups. The survey conducted tries to measure the following points:

a. Look and feel of the proposed version

b. Accessibility of perceiving statuses in the Proposed Interface, compared to the current one

c. Accessibility of editing Profile feature compared to earlier version

d. Accessibility of Audio Call, Video Call and Live location in the proposed version

e. Efficiency of the overall proposed user interface and experience

f. Acceptance of the proposed version over the current version with respect to User Interface

IV. ANALYSIS

After collecting the feedback from the users having tested with the design it was analysed that most of them were quite content and found that the design was very appealing in contrast to the design prevalent in the current application. This can be seen in Fig. 4.1.

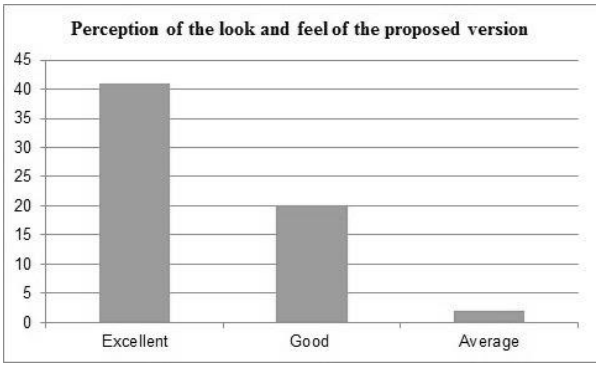

Fig. 4.1 Analysis of the look and feel of the Proposed app

The design was contemplated to replicate the real-world objects as a graphical interface, thus incorporating skeuomorphism and also neumorphism.

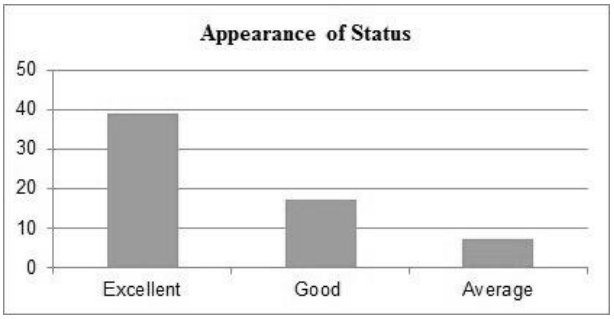

Fig 4.2 Appearance of Status

The general observation was that commonly users prefer to check with the status of contacts in their list to get an update of their activities and their present state. This feature being identified was made convenient so that it is accessible from the landing screen. This can also be edited if required from the same screen. This feature was quite appreciated (Fig. 4.2) which provided motivation and understanding the fact that it is important to identify the necessary behaviour of the users before designing the interface.

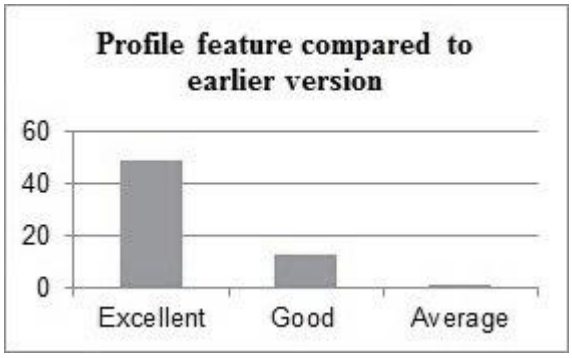

Fig. 4.3 Accessibility of Profile Features

The users have been made to compare and rate the features between the existing Whatsapp Messenger and Proposed Application design. Nearly 80% of them approved of the proposed user interface designed and the same can be observed from the Fig. 4.3.

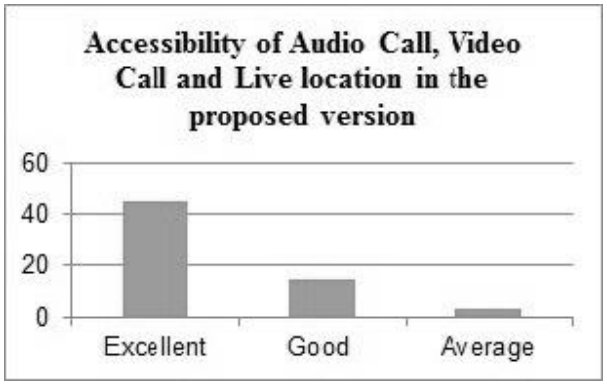

Fig. 4.4 Analysis of accessibility of features (audio chat, video chat and live location)

Some of the significantly small pieces of functionality such as Audio call, Video Call and Live location have been redesigned to ease with its accessibility. It is seen that these are the features which are most predominantly used, hence made visible to the user by swiping the contact. This functionality has been accepted by the users under observation and thus proves the ability to utilise the concepts of UI/UX in an efficient way. As can be seen in Fig 4.4, the analysis ascertains the prior statement; also we see almost 70% of the users taken to liking these features.

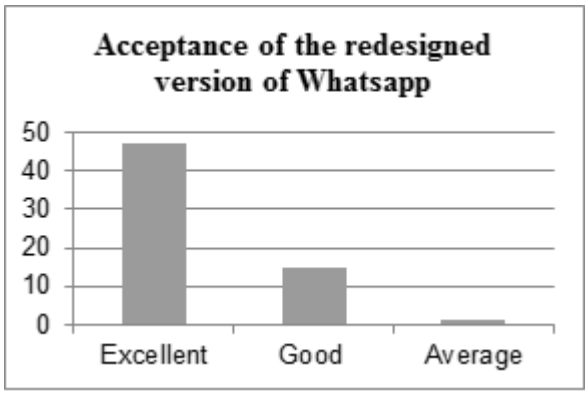

Fig 4.5 Analysis of Users accepting the Redesigned Version of Messenger

Overall the UI/UX currently trending features such as micro or macro interactions, material design components are some of the powerful features which can create a huge impact on the user interface design. It is able to engage the visitors to the application breaking the monotonous process of performing certain mundane tasks and making the interface more real and dynamic. With our design, which we have catered to a set of audiences we can assert on this fact that the users are willing to accept the newly designed interface with the above feature as can be seen in Fig. 4.5.

CONCLUSION

With this article, we come to the conclusion that there are several ways, several concepts in UI whose application encourages and drives user's attention towards the product for a longer period of time, without getting bored! Out of all those concepts in UI/UX design, some of them such as Skeuomorphism, Micro Interactions for better UX, Material Guidelines for designing the components of UI and also the

Heuristic principles have been imbibed in the design prototype. It has been observed that the users were quite satisfied with the look and feel of the interface, experiencing better and efficient UX, and more importantly the features can be accessed with fewer clicks and gestures. Users were much engaged to explore and perceive most of the functionalities on one screen. Location tracking was the most liked interaction. Micro interactions play an important role in grabbing attention of the users as well as making the functionalities quick and simple. Thus, the concepts of UI/UX must be fostered to make more elegant and delicate products.

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A Study on Air Quality Index

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Abstract- Urban air pollution rate has grown to alarming state across the India. Most of the cities are facing issue of poor air quality which fails to meet standards of air for good health. An **air quality index**(AQI) is a numeric representation used by government agencies to tell the people that how polluted the air they are breathing or how polluted it is forecast to become. As the AQI increases, an large percentage of the population is likely to experience increasingly severe adverse health effects.
Number of various methods and algorithms are used by various agencies across the world to compute the AQI requires and the air pollutant concentration over a specified averaging period, the algorithms used are bsed on EPA's (Environmental Protection Agency) method for relating hourly data to the AQI or using technologies like the big data analytics used to process terabytes of data every hour-along with a dispersion model powered by machine learning techniques to get validated, reliable information. World Air Quality Index Project is another social enterprise project started in 2007 providing AQI info for more than 80 countries, covering more than 10,000 stations in 1000 major cities via those two websites: acqin.org and waqi.info which involved in understanding, accessing and verifying those new technologies, which can replace the more traditional setups at a affordable cost. This paper aims to study the various methods used for the calculation and the forecast of the various air pollutants which can help the officials to take necessary actions against the increase of the air pollutants.

Keywords: Air Quality, Real Time AQI

I. INTRODUCTION

Environmental Protection Agency (EPA) has developed the table named Air Quality Index (AQI) to provide accurate, up-to-date and easily understandable information about daily levels of air pollution.
Fresh air saves life but once its get polluted then it can cause long-term as well as short-term health effects. It is found that babies and elders are more affected by the polluted air.

Breathing polluted air puts you at a higher risk for Asthma and Cancer including other respiratory diseases. The severity of the air pollution can be seen as, exposure to air pollution during pregnancy can increase the risk of premature birth, stillbirth and low birth weight. That's why it's a necessity for people to be aware of the quality of the air they are breathing. So it is an important responsibility and accountability of the government of any country to ensure this.

In numbers, AQI is diagrammatic between a scale of '**0**' to '**500**', in which **0** representing **fresh air** and **500** representing **hazardous air**(Values can vary from country to country). The measurement scale is based on a prefixed colour system for a definite value on scale. In India the national AQI was launched in New Delhi on 17th September, 2014 under the Swachh Bharat Abhiyan. The proposed index has 6 categories with elegant colour scheme as follows:

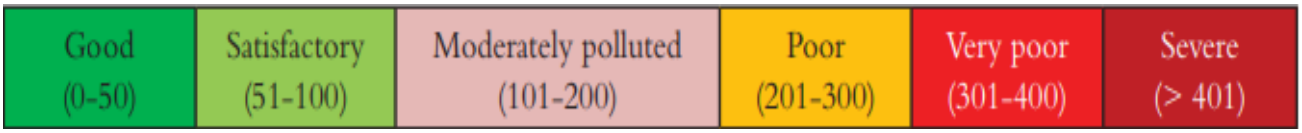

Fig 1: (taken from https://en.wikipedia.org/wiki/Air_quality_index)

Table 1(AQI Values with associated impacts)

AQI	Associated Health Impacts
Good(0-50)	Minimal impact
Satisfactory (51–100)	May cause minor breathing discomfort to sensitive people.
Moderately polluted (101–200)	May cause breathing discomfort to people with lung disease such as asthma, and discomfort to people with heart disease, children and older adults.
Poor (201–300)	May cause breathing discomfort to people on prolonged exposure, and discomfort to people with heart disease.
Very poor (301–400)	May cause respiratory illness to the people on prolonged exposure. Effect may be more pronounced in people with lung and heart diseases.
Severe (401–500)	May cause respiratory impact even on healthy people, and serious health impacts on people with lung/heart disease. The health impacts may be experienced even during light physical activity.

II. LITERATURE REVIEW

The process for AQI calculation is different in different countries which implies that the result of AQI varies from country to country.As we can observe this from following figures in which the AQI of same place (Bandra, Mumbai) is calculated at the same day and time (16-02-2019, 6:00 pm) on three different websites which are:

1. National Air Quality Index (Central Pollution Control Board, Ministry of Environment, Forests and Climate Change)
2. aqicn.org / waqi.inf (The world Air Quality Index Project which is a non-profit project started in 2007 , founded by the team located in Beijing,China.)
3. SAFAR-India (**S**ystem of **A**ir Quality and Weather **F**orecasting **A**nd **R**esearch, Ministry of Earth Science, Govt. Of India. Indian Institute of Tropical Meterology, Pune)

These three websites are giving the different AQI for same place at the same time which is quite confusing. One is showing the AQI as **123 as** in Fig.(2) which is **moderate**, another is showing it as **145 as** in Fig.(3) which is **unhealthy** and the last one is showing the **overall AQI** as **153** in the Fig.(4) .

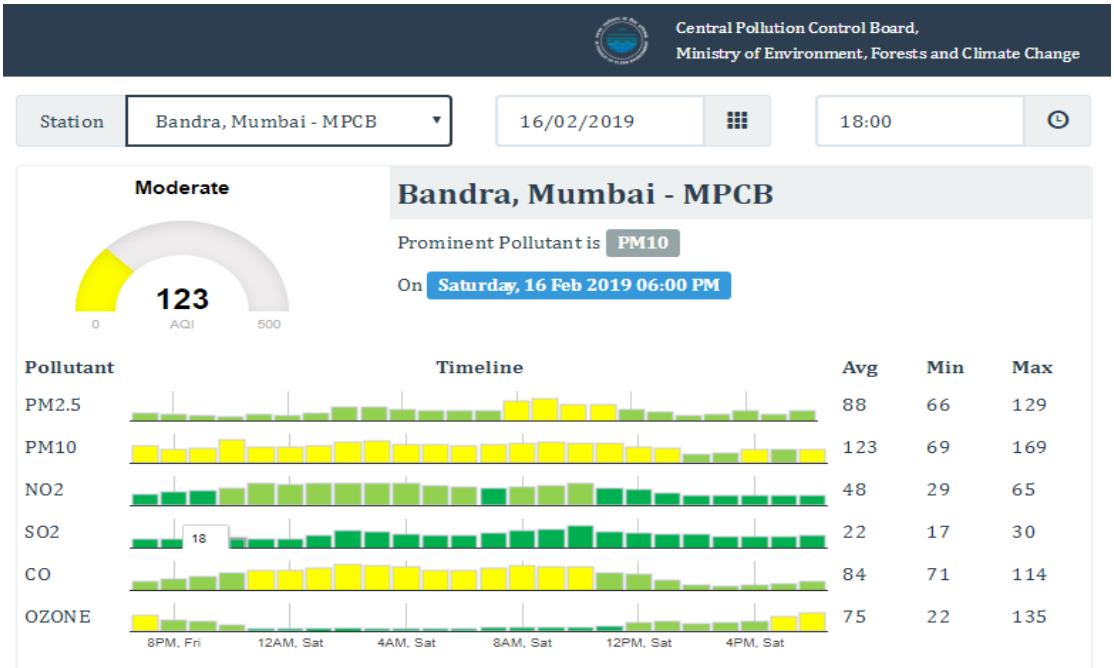

Fig 2: Real Time AQI of Bandra(Mumbai) on Saturday, 16 Feb 2019
Source: National Air Quality Index

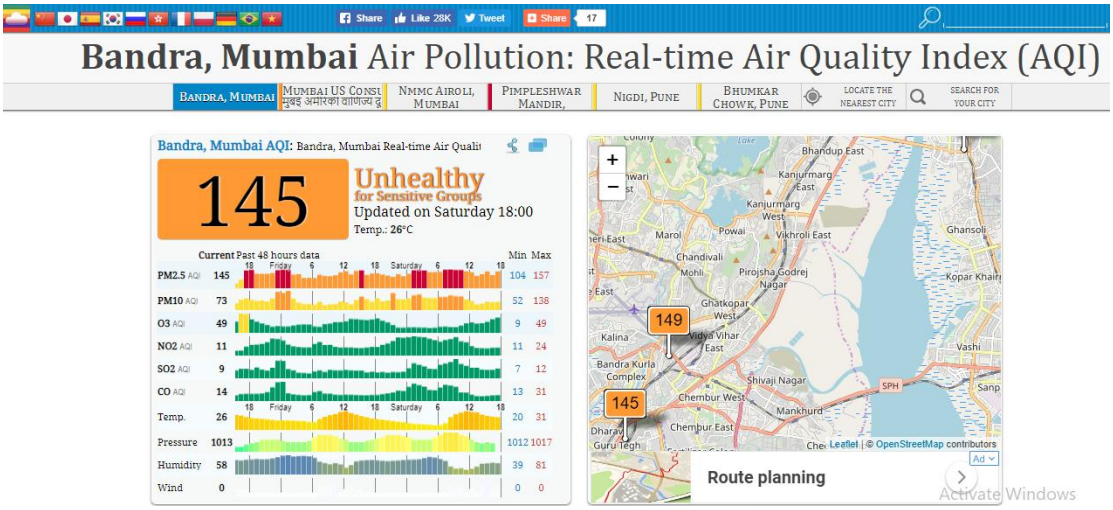

Fig 3:Real Time AQI of Bandra(Mumbai) on Saturday, 16 Feb 2019
Source: aqicn.org, International

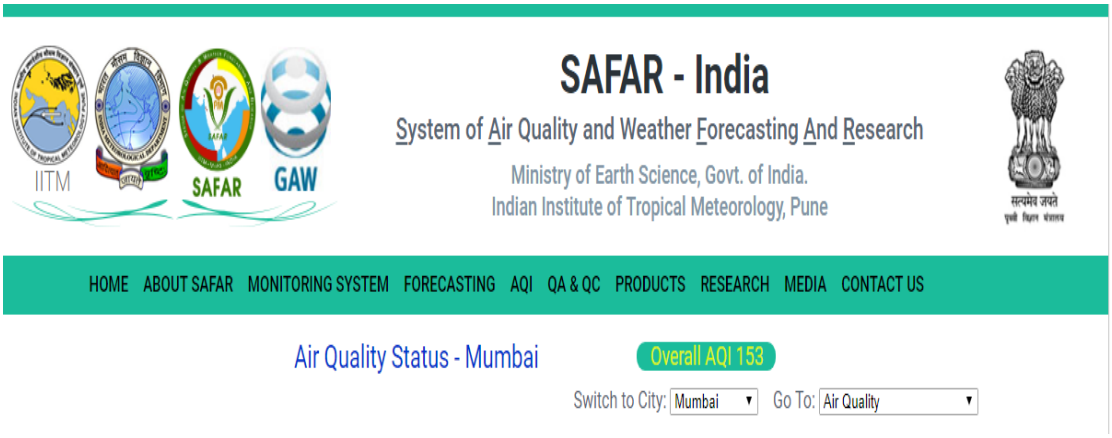

Fig 4:Real Time AQI of Mumbai on Saturday, 16 Feb 2019
Source: SAFAR-India

III. METHODOLOGY

The difference in values of calculated AQI doesn't implies that one of them is falsifying their data. It is just because of different considerations and assumptions which they are making while creating their own API. For example China initially only considered PM2.5 but not the PM10 whereas United State has considered both the values.
In **Canada** , **United Kingdom** and **Hong Kong** the measurement scale provides a number from **1 to 10+** with **1** representing **low risk** and **10+** representing **very high risk** to indicate the level of health risk associated with local air quality whereas in **India**, **South Korea** and **United States** provides the measurement scale numbered from **0** to **500** with the increasing levels of Health Concern.

In India, the AQI is calculated around **5** main pollutants which are:
1. PM10 (Particulate Matter with a diameter less than 10 micrometers)
2. PM2.5 (Particulate Matter with a diameter less than 2.5 micrometers)
3. O3 (Ozone)
4. CO (Carbon Monoxide)
5. NO3 (Nitrogen Dioxide)

In the calculation of AQI, majorly two steps are involved as shown in Fig(3):
1. Calculate individual index for each and every pollutants which is generally known as **sub-index**.

2. Then apply **aggregate function** on previously calculated sub-indexes to finally get **overall AQI**.
Sometimes from the calculated sub-indexes, the index which has the worst value according to the predetermined standards will decide the value of overall AQI or the highest value among the different sub-indexes become the overall AQI.
There are several stations which are established to give the concentration of all the pollutant at that moment in time and the corresponding average over a period of time. For **Carbon Monoxide and Ozone**, the time over which the average is taken foe further calculation is **8 hours**, whereas for the remaining 3, it is **24 hours**. The unit in which the measurement of the concentration of the pollutant is taken is **microgram** and in the case of Carbon Monoxide it is **miligram per cubic meter**.

3.1.1 Sub-Indices

Relationship between the pollutant concentration Y(n) and their corresponding index Index(n) represents the Sub-Index function.So as the concentration of the particular pollutant changes,relative environmental consequences also get reflected as shown in Fig(3).It can be in the form of segmented linear, linear and non-linear.The individual sub-index for the given pollutant is calculated as:

$$\mathbf{I_p = [(I_{HI} - I_{LO})/(BP_{HI} - BP_{LO}) * (C_p - BP_{LO})] + I_{LO}}$$

Where,
$\mathbf{I_p}$ = Index for pollutant p.
$\mathbf{I_{HI}}$ = AQI value corresponding to $BP_{HI.}$
$\mathbf{I_{LO}}$ =AQL value corresponding to $BP_{LO.}$
$\mathbf{BP_{HI}}$ = Breakpoint that is greater than or equal to $C_{p.}$
$\mathbf{BP_{LO}}$ =Breakpoint that is less than or equal to $C_{p.}$
$\mathbf{C_p}$ = Rounded concentration of pollutant p.
The highest index (highest value of I_p) represents the AQI of the location.

3.2.1 Aggregation

After the calculation sub-indices, the next step is to combine them in a simple or weighted additive form like as shown in Fig(3):

$$I = \Sigma W_n I_n \text{ (For n = 1 to i)}$$

Where,
W_n = weightage of the pollutant.
I_n = sub-index for pollutant n.
i = total number of pollutant variables.

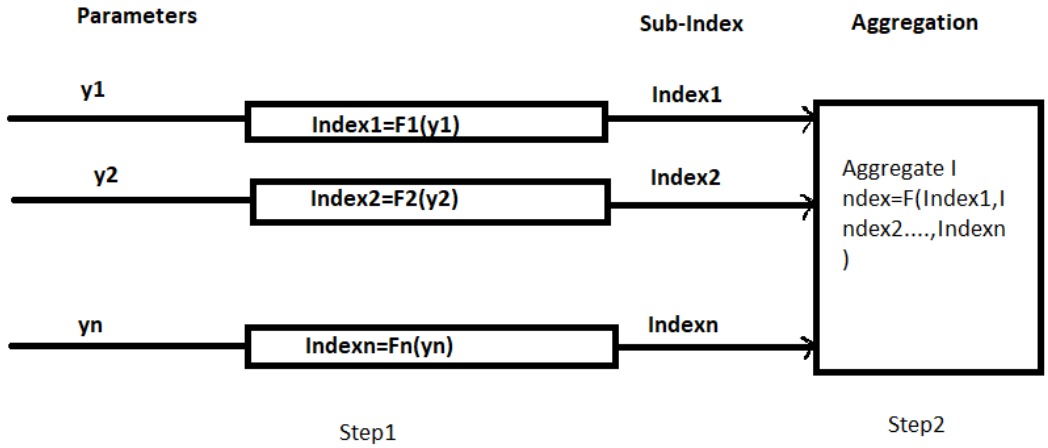

Fig 3: pictorial representation of AQI calculation

IV.IMPLEMENTATION

The **Pollution Detection Application** will help the user in knowing that the city in which they live is facing poor air quality and they have to take cautions.
There are 3-4 mobile apps available in the market to check the city's air quality, some of them are:

- Air Quality | Air Visual
- Air Quality Index Breezometer
- Air matter for ios devices
- SAFAR-Air app launched by government for the citizens in Delhi and Pune

The proposed application is able to produce the result of pollution level based on air quality index of the current location as well as the required location. It shows the pollution level as the air is in good quality or is in dangerous state or is in moderate state and so on. It also gives a short notification associated with the above information like which group of people are in danger primarily.

I have used 3 APIs :

1. aqicn.org
2. AirNow API
3. AirVisual API

The first one is a world wide used api for air quality forecasting.

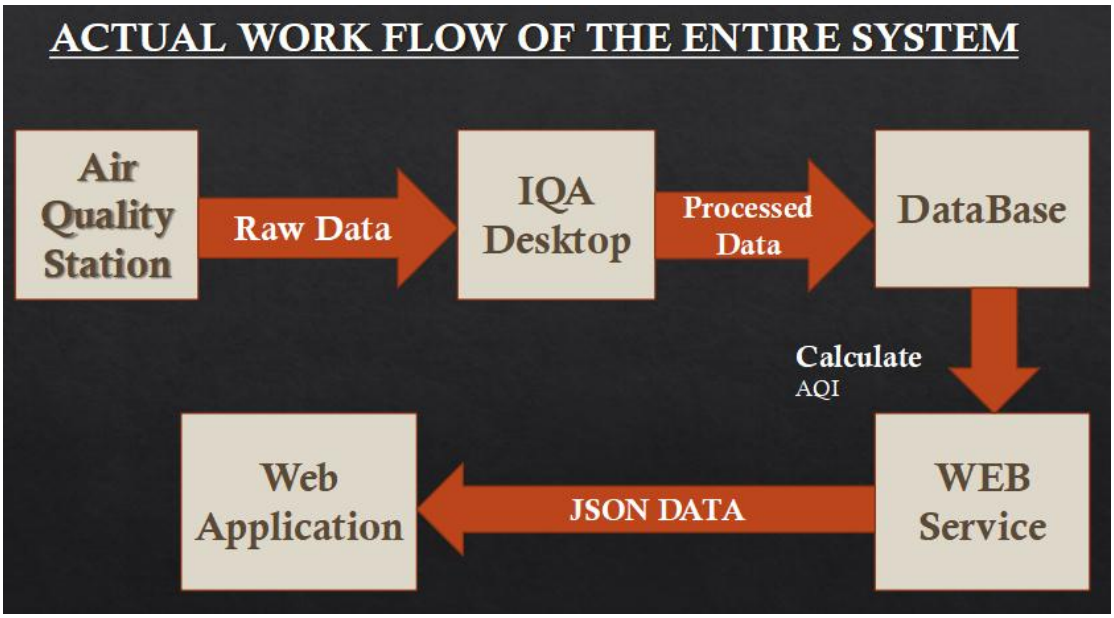

Fig 4: Actual work flow of the entire system

V. CONCLUSION

We understand the basic meaning of Air Quality Index and the general approach used in the calculation of AQI.

- The AQI is an effective way to communicate the status of the polluted air to the general public in the simple color-coded form.
- It is an unitless index which indicates the air quality and its health effects.
- The AQI of the same place at the same time may vary from website to website which doesn't implies any false impression and misleading data.
- It is of utmost importance to prepare indices according to the predefined standard of each pollutant.

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Analyzing and Visualizing the Impact of Covid-19 on the World

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Abstract - The Novel Corona virus is emerging as a Global public health threat. The outbreak initially emerged in Wuhan, China, large numbers of patients were getting sick because of Pneumonia and later it was found that they were infected with the Novel Corona virus this emphasizes the importance of analyzing the data of this virus and predicting their risks of infecting people all around the globe. In this study, we present an effort to compile and analyze the outbreak information on COVID19 based on the open datasets on 2019 nCoV provided by the Johns Hopkins University, World Health Organization. An exploratory data analysis with visualizations has been made to understand the number of different cases reported (confirmed, death, and re-covered) in the World. Overall, at the outset of an outbreak like this, it is highly important to readily provide information to begin the evaluation necessary to understand the risks and begin containment activities.

Keywords – Data Visualization, Covid-19, Data Analysis, Dashboard, Novel Corona-Virus, Power Bi, SARS-COV-2

I. INTRODUCTION

The Novel Corona Virus is spreading rapidly in the major countries of the world and as no vaccine is been developed, the contagion is spreading day by day. To tackle the crisis many countries are on temporal lockdown. A global lockdown of this magnitude is affecting the world economy. So, paper presents an effort to compile and analyze the outbreak information on covid19, the data set is taken for from "center for systems science and engineering at Johns Hopkins University (JHU)".

There is an obvious concern globally regarding the fact about the emerging coronavirus 2019 novel coronavirus (2019- nCoV) as a worldwide public health threat. As the out-break of COVID- 19 causes by the severe acute respiratory syndrome coronavirus 2(SARS- CoV- 2) progresses within China and beyond, rapidly available epidemiological data are needed to guide strategies for situational awareness and intervention. The recent outbreak of pneumonia in Wuhan, China, caused by the SARS- CoV- 2 emphasizes the importance of analyzing the epidemiological data of this novel virus and predicting their risks of infecting people all around the globe. In this study, we present an effort to compile and analyze epidemiologica l outbreak information on COVID- 19 based on the several open datasets on 2019- nCoV provided by the Johns Hopkins University, World Health Organization, Chinese Center for Disease Control and Prevention, National Health Commission, and DXY. An exploratory data analysis with visualizations has been made to understand the number of different cases reported (confirmed, death, and recovered) in different provinces of China and outside of China. Overall, at the outset of an outbreak like this, it is highly important to readily provide information to begin the evaluation necessary to understand the risks and begin containment activities. There is an obvious concern globally regarding the fact about the emerging coronavirus2019 novel coronavirus (2019-nCoV) as a worldwide public health threat. As the out-break of COVID-19 causes by the severe acute respiratory syndrome coronavirus 2(SARS-CoV-2) progresses within China and beyond, rapidly available epidemiological data are needed to guide strategies for situational awareness and intervention. The recent outbreak of pneumonia in Wuhan, China, caused by the SARS-CoV-2 emphasizes the importance of analyzing the epidemiological data of this novel virus and predicting their risks of infecting people all around the globe. In this study, we present an effort to compile and analyze epidemiologica l outbreak information on COVID-19 based on the several open datasets on 2019-nCoV provided by the Johns Hopkins University, World Health Organization, Chinese Center for Disease Control and Prevention, National Health Commission, and DXY. An exploratory data analysis with visualizations has been made to understand the number of different cases reported (confirmed, death, and re-covered) in different provinces of China and outside of China. Overall, at the outset of an out break like this, it is highly important to readily provide information to begin the evaluation necessary to understand the risks and begin containment activities.

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The objectives of research paper are:

1. To analyze the spread of the novel corona-virus on the world.
2. Visualizing the impact of Covid-19.
3. To find confirmed cases, death totals, recovered cases, non-recovered cases, recovery rate and active cases.

II. LITERATURE REVIEW

Samrat K.Dey [1] helps the reviewer with Data Analysis and Exploratory data analysis. In his paper he visualizes the data and fights trends and insight on the Data.

Jrhau Lung, [2] help reviewers with the chemical structure of the anti-Sars-Cov-2 RNA-dependent RNA polymerase. This paper shows us the actual RNA of the Virus and the components of the Virus.

Richard I. Horowitz [3] publish a paper on the Efficacy of Glutathione Therapy in Relieving Dyspnea Associated With COVID-19 Pneumonia: A Report of 2 Cases. In his paper he species the Glutathione Therapy in Relieving Dyspnea Associated With COVID-19 Pneumonia.

Zhu N, Zhang [4] in this paper the author reviews the Virus Genome Structure and the test the Various results of Covid-19 Pneumonia patients according to their age.

Drosten .C [5] in his paper the author writes about the transmission, Scientific Structure and Diagnosis about the virus.

Lauren G. [6] this is a Dashboard published by CSSE at John Hopkins University (JHU) this dashboard contains live information about the world wide Active cases, Deaths, Recovered patients, etc.

Centers for Disease Control and Prevention.[7] here we can see the Cases Count in United states according to the Race of the Individuals, age, new cases day by day, etc.

Ji Wie [8] studies the Cross-species transmission of the newly identified coronavirus 2019-nCoV. This paper studies that how the Virus can be Spread from one species to another.

III. RESEARCH METHODS

Open dataset of 2019 nCoV provided by the Johns Hopkins University is used for the research paper. An exceptional dashboard using the affected cases data to date, provided the data available in Google sheets format. This data-set consists of day to day information on the number of affected cases, deaths, and recovery on the cases of novel corona-virus.

Power BI is a collection of software services, apps, and connectors that work together to turn our unrelated sources of data into coherent, visually immersive, and interactive insights. It is one of the Powerful Data Analytics and Visualization tool.

The first step is to load the Dataset in power BI and then transform it according to requirements and Model the dataset to create a relationship between the individual tables so that the data can be accessed from one individual table to another. After data modeling in the next step is to create charts, metrics, tables and visuals to get insight on the Data. We would be creating tables, Charts, maps in power Bi to analyze and Visualize the Spread of the Virus.

IV. DATA ANALYSIS & VISUALIZATION

The dataset is analyzed with different EDA methods and is visualize data to provide a sufficient consciousness regarding the outbreak of COVID 19 all over the globe. Research paper analyze and visualize data between 22 January 2020 and 9 April 2020. However, at first massive number of cases were reported from China compared to the rest of the world, and then the Pandemic started spreading to other countries, the most affected countries after china are United States, Spain, Italy, France, Germany, Iran, United Kingdom, etc.

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Figure 1: Visual Demonstration

Country	Confirmed	3 Day Change	Recovery Rate	Deaths
United States	4,61,437	26%	5.51%	16,478
Spain	1,53,222	12%	34.05%	15,447
Italy	1,43,626	8%	19.82%	18,279
France	1,18,781	20%	19.71%	12,228
Germany	1,18,181	14%	44.34%	2,607
China	82,883	0%	93.72%	3,339
Iran	66,220	9%	48.79%	4,110
United Kingdom	65,872	26%	0.54%	7,993
Turkey	42,282	40%	5.07%	908
Belgium	24,983	20%	20.67%	2,523
Switzerland	24,051	11%	44.07%	948
Netherlands	21,903	16%	1.27%	2,403
Canada	20,654	25%	24.99%	503
Brazil	18,092	49%	0.96%	950
Portugal	13,956	19%	1.47%	409
Austria	13,244	8%	39.57%	295
South Korea	10,423	1%	66.90%	204
Russia	10,131	60%	6.89%	76
Israel	9,968	12%	10.14%	86
Sweden	9,141	27%	2.24%	793
India	6,725	41%	9.22%	226
Ireland	6,574	23%	0.38%	263
Norway	6,211	6%	0.52%	108
Australia	6,108	5%	24.10%	51
Chile	5,972	24%	21.33%	57
Denmark	5,830	20%	32.30%	237
Poland	5,575	26%	5.09%	174
Czech Republic	5,569	15%	5.40%	112
Peru	5,256	105%	27.36%	138
Romania	5,202	28%	12.44%	248
Ecuador	4,965	33%	6.83%	272
Total	**15,95,350**	**19%**	**22.19%**	**95,455**

Figure 1 depicts the visual demonstrating the confirmed cases according to the country, 3 days change, recovery rate and deaths.

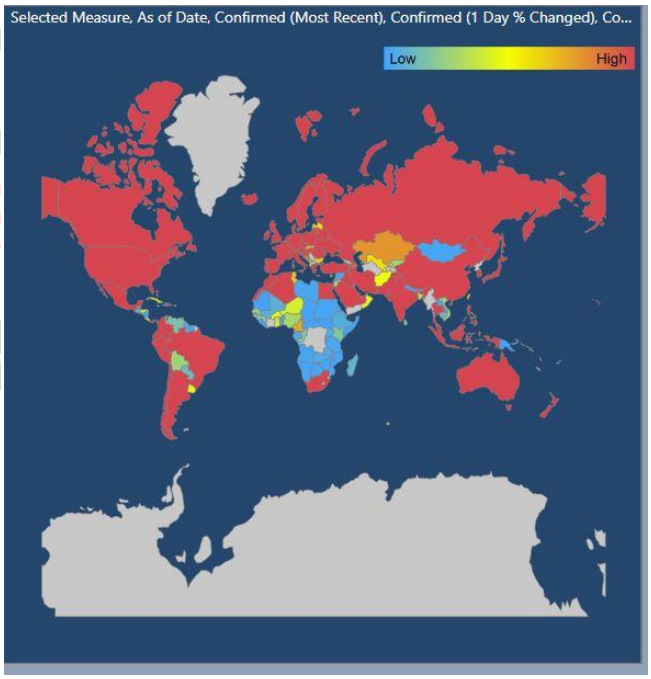
As on 9th April 2020 the number of confirmed cases in united states were 4,61,437, 3 day change was 26%, recovery rate was 5.51% and total deaths were 16,478. Similarly, the number of confirmed cases in Spain were 1,53,222, 3 day change was 12% and recovery rate was 34.05% and total deaths were 15,447. There is a huge gap in the numbers of confirmed cases for both of these countries but there is less gap in their death counts. Similarly, in Italy the confirmed cases are less than Spain and United States but their death count is highest in the world.

The study is to analyze three different categories of data including confirmed cases, death, and recovered cases in the world from a time period of 22 January to 9 April 2020. This will provide a comparative analysis of all the cases reported in the world. After analyzing, there were 15,95,350 confirmed cases of COVID 19 on 9th April 2020. The total countries affected are shown in figure 2. Figure 3 shows the severity of the pandemic.

The Figure 2 denotes the Spread of Novel Corona virus on the Global Map it shows the Spread of the virus and it's Severity on different countries as we can see that North America is More affected than South America and there are more number of Cases in North America as compared to South America. According to the figure the most Affected countries in the World were European Countries. As we can see that Australia, Africa and Asia have less number of known Cases but the Spread is not as Severe as Compared to U.S.A.

Figure 2: Spread of Novel Corona Virus

Figure 3: Severity of the pandemic



In Figure 3 we can see the Severity of the spread of Novel Corona Virus on the world map, the countries Colored red are the Countries which are most affected by the Spread of the virus and countries which are colored white have no known cases of novel corona virus and countries which are colored apart from red and white have less severity of spread.

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Figure 4: Recovery Rate

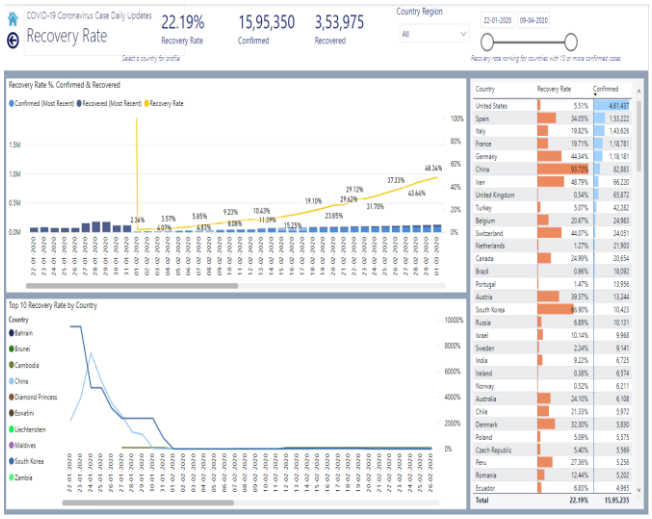

Figure 4 shows the recovery rate as we can see from 01-02-2020 to 01-03-2020 the recovery rate has gone up from 2.36% to 48.34% and the global recovery rate is 22.19% as 15,95,350 confirmed cases globally out of which 3,53,975 have recovered. The most affected Country is United States as the total Case Count reached to 4,61,437 followed by Spain-1,53,222, Italy-1,43,626, France- 1,18,781, Germany-1,18,181, China- 82,883 and so on.

V. RESULTS

The Global Cases Count as of 9th April 2020 are as follows:

- Confirmed Cases- 15,95,350
- Active Cases- 12,41,375
- Recovered Cases- 3,53,975
- Non-Recovered Cases- 12,41,375
- Recovery Rate- 22.19%
- Deaths Worldwide- 95,455

Total Covid-19 cases Worldwide were analyzed and the visuals indicate that the most affected Countries in the world are USA, Spain, Italy, France, Germany, China, Iran, UK, Turkey. More than 187 countries and territories in the world are affected by Novel Coronavirus and the Spread is increasing day by day.

VI. CONCLUSION

It is found that as on 9th April 2020 United States is leading in number of confirmed cases in the world rising to 4,61,437 and having a deaths total to 16,478 and 4,36,027 total non-recovered cases.

The most populated country in the world where the outbreak began that is China has the highest recovery rate in the world ranging to 93.72% no other countries have such a high rate of recovery and the confirmed cases count is just 82,883 and death count is 3,339.

In Italy the confirmed cases are 1,434,626 less than US and Spain but the death count is highest in the world ranging to 18,279.

The visuals indicate that the most affected Countries in the world are USA, Spain, Italy, France, Germany, China, Iran, UK, Turkey.

In UK confirmed cases were 65,872 and active cases were 65,513 and no of deaths 7,993 but the recovery rate is 0.54% which is very less as compared to other affected countries.

The pandemic of such a magnitude can be handled but we need correct data to analyze the patterns or the trends in the data, so with the help of this findings Governments of the world can take measures and develop strategies to stop the spread of the Virus.

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IMPACT OF FRAUDS ON THE INDIAN BANKING SECTOR

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ABSTRACT
Banking sector, one of the growing industries in India. The sector which is responsible for money markets, the financial sector and for the economic growth. Even though this growth is seamless but it consists of lots of efforts and frauds which becomes the rising trend in this market. Because of this frauds banking sector has face crore rupees of loss which term as scams and this creates a need for reevaluating the factors which are responsible for this unsecure transaction and analyzed the trends for secure banking. The present study makes an attempt to review the trends responsible for these frauds and their impacts on Non-Performing Assets (NPA) of the India. Further this study shows how these frauds have the impact on the profitability of banking sector. Along with this it shows how the increasing number of frauds leading to the rise into the NPAs and severely impacting the profitability of banking sector in India. In order to overcome with this situation, the only safeguard is to stringent the security policies and find the new measures for reducing and preventing the number of frauds so the reliability of Indian banks will not only improve but it will also help to provide a new face to the banking sector of India.

Keywords: Banking sectors, frauds, safeguard, non-performing assets

I. INTRODUCTION
The power of any growing economy is set on when we put its banking system into the test. In spite of the recession faced by the economy all over the world, India has managed to reasonably balanced its economy and still has an immense growth potential in this sector. While improving the performance in this sector, it would contain the series of vulnerabilities which are still unaddressed and due to which the image of banking sector gets affected. The main reason for this and which is also one of the primal risk factors is the increasing number of frauds Indian banking sector experiences in past five years.

Fraud becomes one of the major problems that Indian banking sector faced but along with this its increasing number shows that how difficult it is to prevent such kind of fraudulent activities which not only affect the image of banking system but result into the loss of profitability also.

The health of financial and banking system defines the pattern between the production and consumption. It also helps to determine the living standard of the citizens. Therefore, if it has a threat of having frauds and unsecure transactions then becomes a source of worry as it creates more NPAs.

As per the study, the number of frauds increased in recent years are steadily increased. In India, these frauds are considered as a transactional activity, but in reality, it has a really complicated relationship with the profitability of banking sector and the economy of India.

II. LITERATURE REVIEW
Jeffords et al., (1992) "in the period of 9 years between 1981-1989 inspected total 910 cases to get the knowledge about different risk factors involved in frauds. There are approximately 63% of cases were classified as the internal control risks." After this, Calderon and Green (1994) "from 1986 to 1990 made an examination of 114 actual cases of corporate fraud. From this study it is observed that there are 45% of staff members were involved in such fraud cases." Ziegenfuss (1996) also inspect to get to know about the amount and different types of fraud takes place in state and local government.

Bhasin (2007), "inspect the various reasons, dimensions and the manner by which the internal auditors combined in the process of detection and prevention of frauds in banks". To experience the new

technology applications is one of the challenges for banks as it will help them to control the frauds and to prevent the security issues.

Ganesh and Raghurama (2008), conducted a survey with 80 executives from Corporation Bank and Karnataka Bank of India. "In this survey they ask their respondents to rate their co-workers in terms of the skills which developed in them after they experienced the training programs provided to them." From the responses it is observed that the skills of the staff members for the 17 different skill sets were increased tremendously. Another study was conducted by Khanna and Arora (2009), to study about the causes which are responsible for bank frauds and the execution of preventive security norms in Indian banking industry.This study "observe that there are multiple reasons behind the frauds that takes place in banks. The study indicates that lack of training is one of the causes for this." overburdened staff, competition, low compliance level are the main reasons for bank frauds."

Bhasin (2011) states that, "Frauds generally takes place when there are insufficient safeguards and prevention controls, or when there is not careful approach to follow, therefore it provides good chances for those who perform fraudulent activities. Frauds are increasing and fraudsters are becoming more experienced and innovative".

Pasricha and Mehrotra (2014) states that "making banking sector free from the electronic crime is also one of the challenges that banking sector facing in today's era." There are multiple operational areas in banking sector which provides a good opportunity for fraudsters, especially in inter-branch transactions, deposit and loan.

Sanjeev Gupta and P. K. Gupta (2015) examined that the administrative system is not that much strong and it redefinition for auditors role is required. This study states that the frauds can be reduced by implementing the safeguard policies and taking conscious actions by auditors and the corporate executives who are willingly avoided these frauds due to the pressures from investors, government security regulators and because of the market fluctuations.

III. OBJECTIVES

1. To get to know about the trends of fraudulent activities which have impact on the Indian Banking Sector.
2. To get to know about the impact of fraudulent activities on the NPAs on Indian Banking Sector.
3. To get to know about the impact of fraudulent activities on the profitability of Indian Banking Sector.

IV. HYPOTHESIS

1. To get to know about the influence of fraudulent activities on the NPAs on our Banking Sector.

H_o: Fraudulent activities don't influence the NPAs of banking sector.

H_1: Fraudulent activities have influence on the NPAs of banking sector.

2. To get to know about how the profitability of Indian Banking Sector affects due to fraudulent activities.

H_o: Profitability have influence of all these fraudulent activities.

H_1: Profitability don't have influence of all these fraudulent activities.

V. RESEARCH METHODOLOGY

For present study purpose, secondary data is used. These data are collected from the RBI's stability reports which published on every year. Along with this RBI's website is used, there are some academic journals which have information regarding banking frauds, some newspapers which have articles written on the same topic

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VI. DATA ANALYSIS

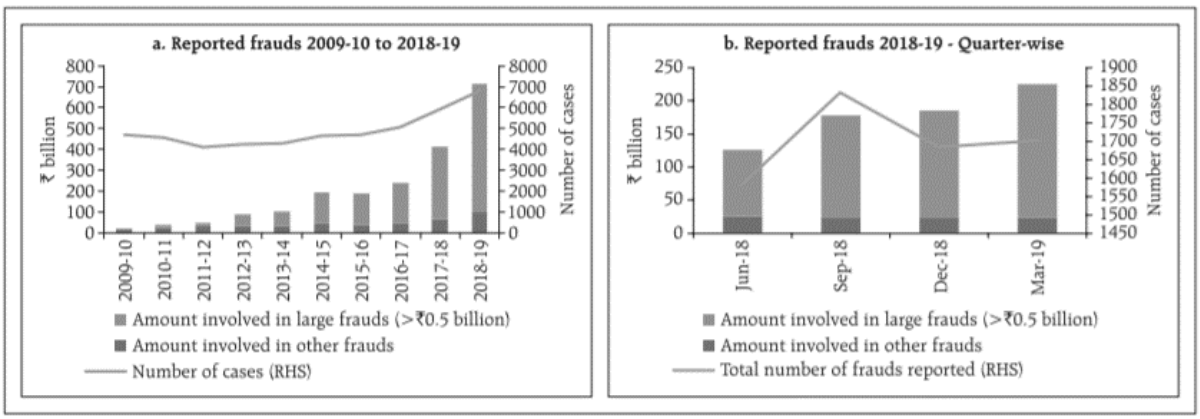
Table 1. Number of Frauds and amount involved in Frauds in Indian Banking Sector

Financial Year	Frauds involving ₹1 Lakh and above			
	No. of Frauds	Percentage Increase	Amount Involved (in billions)	Percentage Increase
2013-14	4306	-	101.71	-
2014-15	4639	1.16	194.55	-3.90
2015-16	4693	8.16	186.99	28.00
2016-17	5076	16.57	239.34	72.01
2017-18	5916	7.73	411.68	91.30
2018-19	6801	15.00	715.43	73.8

Source: The Economics Times

Table 1 represents the number of frauds takes place between the year 2013 and 2019 along with the amount involved in these frauds. The table also represents percentage increment in the number of frauds and the drastic increment in amount of frauds.

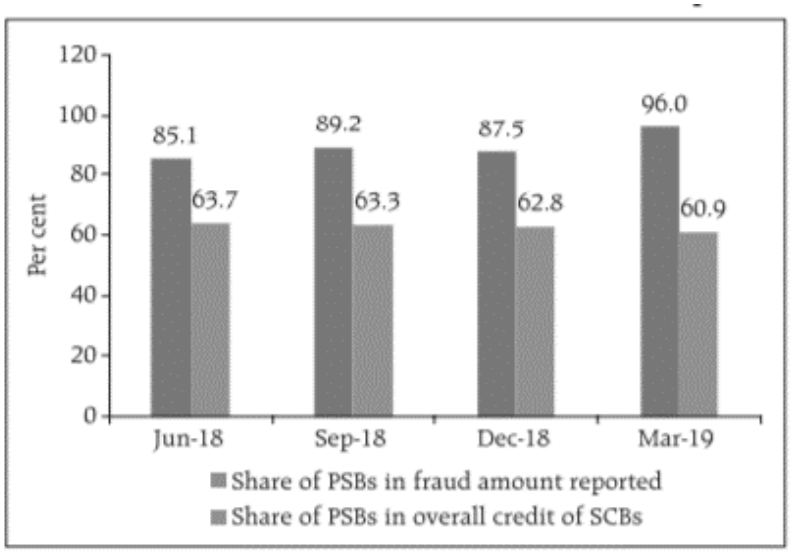
Chart 1: Frauds reported in the banking sector (amount involved > = ₹0.1 million)



Source: The Reserve Bank of India Report.

Chart 1 presents the brief analysis of frauds with amounts involving ₹ 0.1 million and above reported in past 10 years.

Chart 2: Relative share of PSBs in overall fraud amount reported.



Source: The Reserve Bank of India Report.

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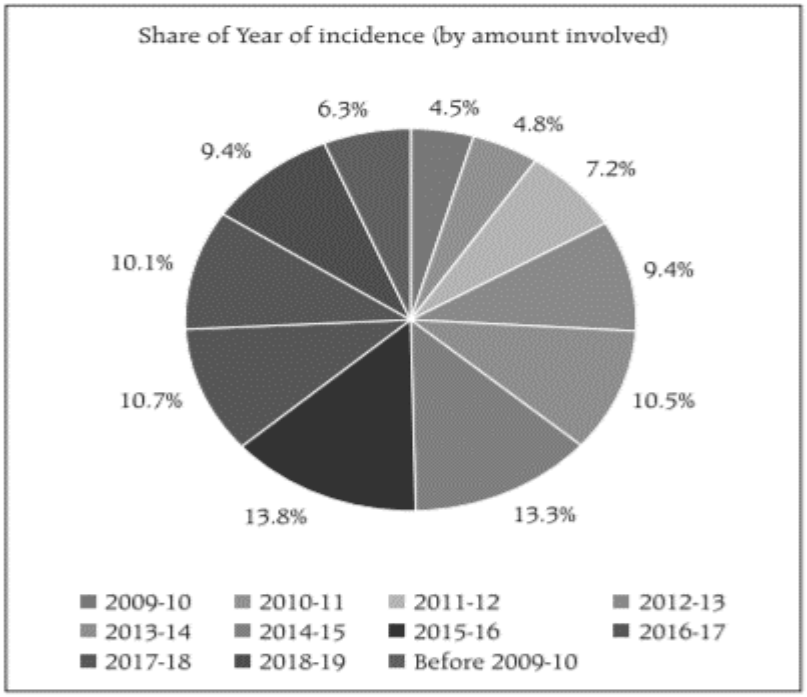
The above chart describes the share of PSBs in the amount of frauds which were reported in 2018-19 was more than that of the share involved in credit.

Chart 3: Vintage of Frauds reported in 2018-19

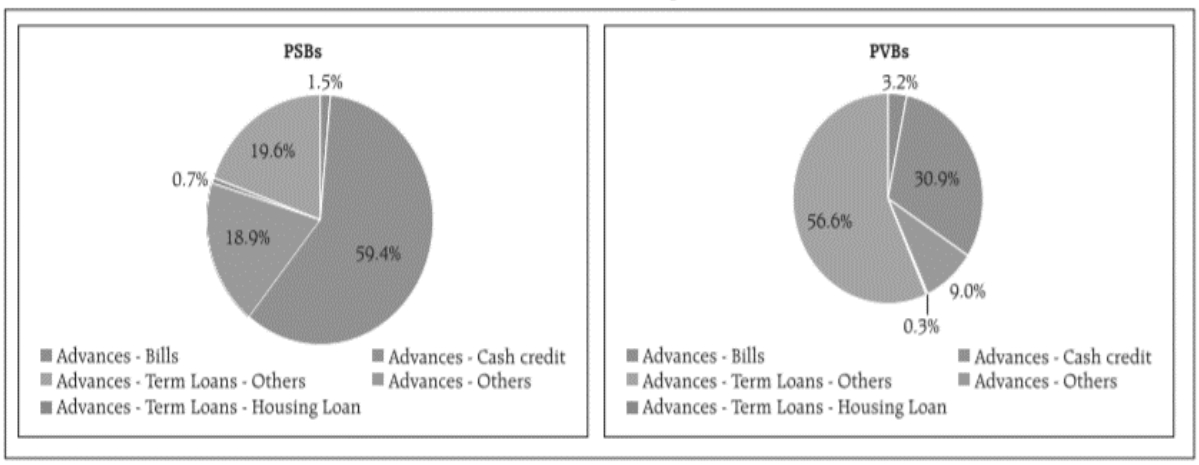
(Amount involved > = ₹ 0.1 million)



Source: The Reserve Bank of India Report.

Chart 3 clarifies there is a time-difference between the date when fraud occurs and the date when it actually reports. There is 90.6% of amount involved in frauds reported in the period from 2000-02 to 2017-18 than that of reported in 2018-19.

Chart 4: Advance related frauds reported in 2018-19



Source: The Reserve Bank of India Report.

As per the earlier trends, it is observed that the loans and the advances related to frauds are still continued to be commanding, in aggregate constituting 90 per cent of all frauds which was reported between 2018 and 2019 by value. The major source of advance related fraud's category consist of the cash credit or working capital loans taken through PSBs and retail loans (non-housing) taken from PVBs.

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Table 2 Gross NPAs to Gross Advances Ratio

Year	Gross NPAs to Gross Advances Ratio (%)
2013-14	3.83
2014-15	4.27
2015-16	7.48
2016-17	9.32
2017-18	11.18
2018-19	9.3

Source: RBI Financial Stability Report 2019

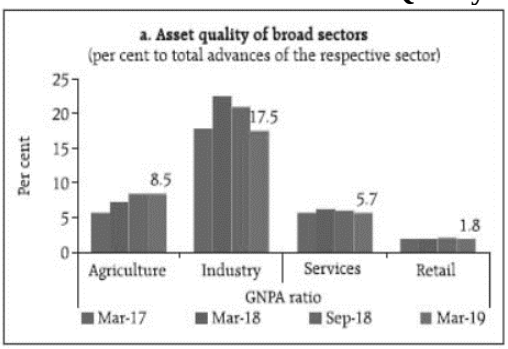
Table 2 provides an overview of Gross NPA to Gross Advance Ratio (%). It is shown that the ratio increases over the year but during FY18-19 it is declined to 9.3 percent as on March 2019 against the peak of 11.18 percent recorded in March 2018.

Table 3 Effect of fraudulent activities on NPAs in the Indian Banking Sector

Regression Statistics	
P-value	0.048
Coefficients	26.41
R^2	0.87
Source: Authors Compilation	

Table 3 shows the regression statistics used to find the effect of NPAs on banking sector. Here, amount involved in frauds is considered to be a independent variable whereas Gross NPA as a dependent variable. From above table, R square value is 0.87 which states that 87% variations in Non-Performing Assets are caused by the frauds. At 5 level percent of significance, frauds have an impact on NPAs. Positive value of coefficient shows that the rise in frauds results into rise in NPAs. With all these observations, we are going to reject the null Hypothesis and summarize that frauds have significant influence on the NPAs in Banking Sector.

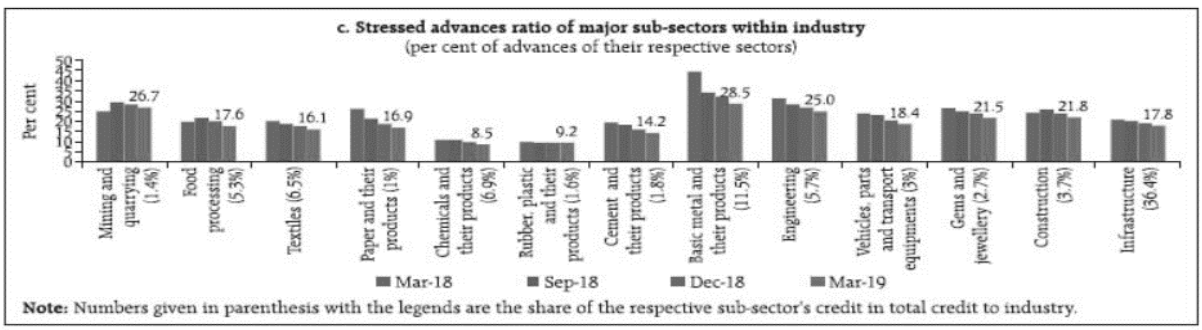
Chart 5 Broad Sector's Asset Quality



Source: The Reserve Bank of India Report.

Chart 5 shows the Broad Sector's asset quality in economy. The Gross NPA Ratio and Stressed Advances are considered as two indicators for asset quality.

Chart 6 Stressed Advances Ratio of Major Sub-Sectors within Industry.



Source: The Reserve Bank of India Report.

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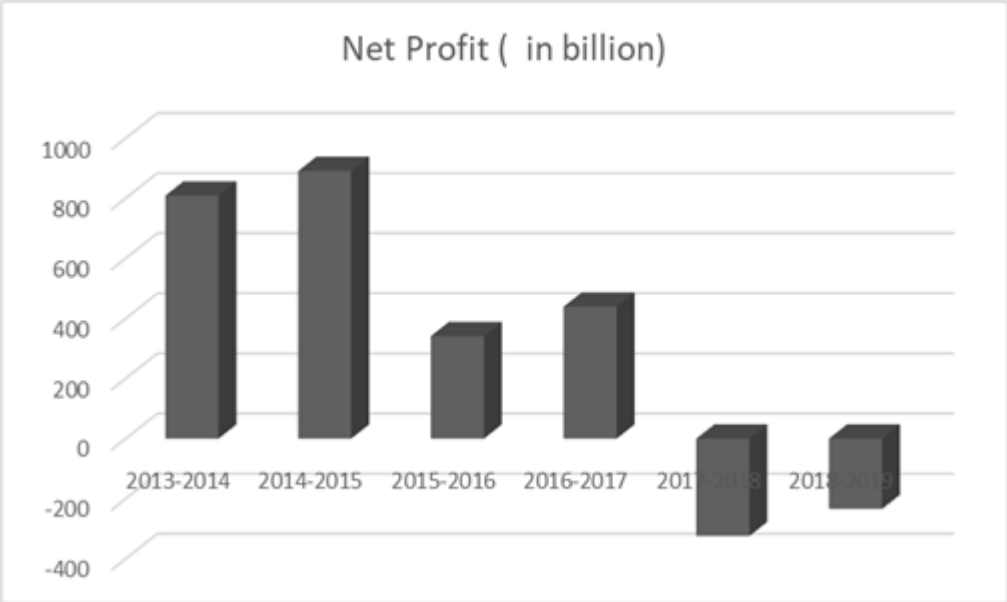
Chart 6 indicates the classification of Asset Quality of sub-sectors withing the different commercial sector. From the above chart we can observe that the Basic metal and their product have the best stressed advances ratio. The stressed advance ration ranging between 5% to 25% of the whole loans advanced in opposite sub sectors.

Table 4 Profit of the schedule banks

Financial Year	Net Profit (₹ in a billion)
2013-2014	809.13
2014-2015	890.78
2015-2016	341.48
2016-2017	439.00
2017-2018	-324.38
2018-2019	-233.97

Source: RBI Financial Stability Report 2019

Chart 7 Impact of Frauds on the Indian Banking Sector



Source: The Reserve Bank of India Report.

Table 4 and chart 7 shows the impact of frauds on the profitability of Indian Banking Sector. It is seen that the profitability of banks continuously declined by the year which is an eye-opener for the Indian banking sector.

Table 5 Effect of fraudulent activities on profitability of Indian Banking Sector

Regression Statistics	
P-value	0.049
Coefficients	-3.89
R^2	0.82
Source: Authors Compilation	

From the above observations, independent variable is the amount involved in frauds whereas Gross NPAs are treated as a dependent variable for regression analysis. From above table, R square value is 0.82 which states that 82% variations in Profitability are explained by the frauds. At 5 level percent of significance, frauds have an impact on profitability. Negative value of coefficient shows that the rise in frauds results into declining of profitability of banking sector. With all these observations, we are going to reject the null Hypothesis and conclude that the Profitability of Indian Banking sector gets affected due to the Fraudulent activities.

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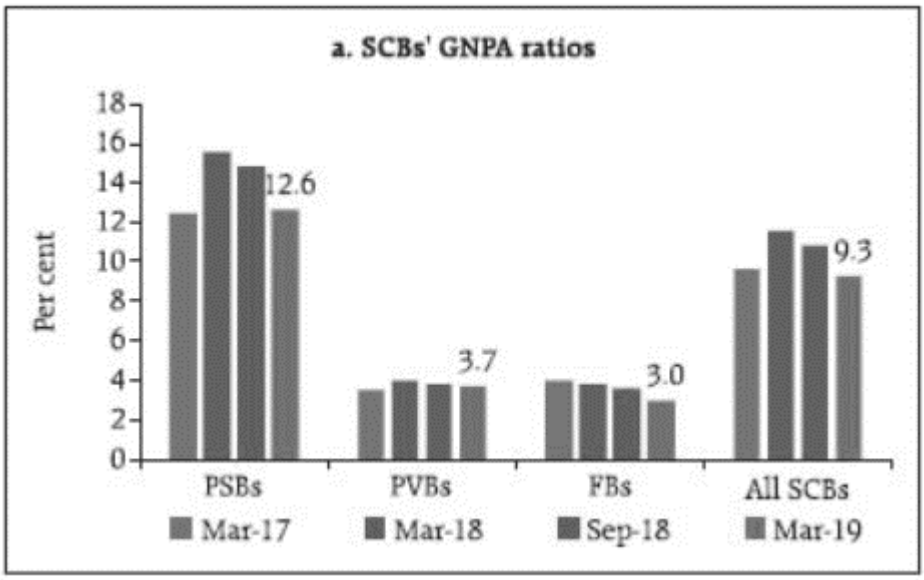
Chart 8: SCB's GNPA ratios



Source: The Reserve Bank of India Report.

Figure 6 gives a brief idea about the Gross NPA for the FY 2018 and also represents the NPAs for FY 2019.The prediction for the year 2018-19 of system level GNPAs has been done using three different and complementary econometric model which includes multivariate regression, vector autoregressive and quantile regression which can involve the risks. There is increase in the projection of NPAs as shown in the figure

VII. CONCLUSION

Due to the post liberalization era, the growth of Indian Banking sector seems to be more but along with that it also faces a lot of challenges; one of them is the number of frauds increasing in day by day activities. These fraudulent activities badly impact the banking sector as it results into losses and also affects banking credibility. It also creates financial dilemmas on banks and their clients, similarly it also causes a big reduction within the quantum of cash which is accessible for economic development.

So, following are the conclusions from the present study:

- The amount involved in frauds is increases as number of fraudulent activities increased.
- Advances taken by the bank is main reason behind many frauds which is again not good for banking sector.
- There is an increasing trend between Gross NPAs and Gross Advances Ratio over the year.
- Fraudulent activities have a major influence on NPAs within the Indian banking sector.
- All these fraudulent activities have adverse effect on the profitability of banking sector which is an eye opener for the sector.

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TITLE OF THE PAPER: IMPACT AND IMPORTANCE OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING APPS FOR TREATING DEPRESSION

☐ **Priyanka Mane***
Gunjan Behl**

ABSTRACT

Depression may be a psychological state disorder characterized by persistently depressed mood or loss of interest in activities, causing significant impairment in lifestyle. It is one of the leading causes, and it can be seen irrespective of the age groups, including children to old age person.

In order to treating this depression Artificial intelligence and machine learning are making their entries in the medical section. Companies and their scientists are using Artificial intelligence, Machine learning, Natural language processing (NLP) for developing different applications and systems with considering the depression. But the key factor is we have to check impact of these technologies over society, because human brain is much more complex to understand by just analytics. So in this paper we will review the technologies which are currently used in market by most users for treating depression, and view their impact on the human society and life which will help us to understand their role better.

Keywords*: Conversation agents, chatbots, Natural language processing, Artificial intelligence, impact on mental health, depression*

1. INTRODUCTION

Depression is one of the type of illness which can't be seen from outside by just looking at that person. Globally, by WHO - More than 264 million people of all ages suffer from depression, close to 80,000 died due to suicidal thoughts every year, which will be approximately one person every 40 seconds? It is the second leading explanation for death among 15-29 year olds globally [1].It also predicted that by 2020, 20% of Indian Population will suffer from mental illness. It also says that by next year it will be second-largest disease burden for entire world.

On one side, we have a very unique case of depression in each individual. No two cases of depression are the same because individuals differ in their background and previous experiences, in their knowledge, in their thought patterns, in their life circumstances, and similar. While two different cases of depression may resemble to some degree, there is a need to approach each patient individually as a unique case. There is some behaviour which maybe found similar in some patients.

Some of the questions that arises while understanding the role of AI and Ml for treating depression:

1. What type of AI/ML applications are used for treating?
2. For how much period patient has to use these applications?

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3. What is doctor's concern about these new applications, and how much they are responding to it?
4. Are these Apps/apps are legally verified to be experimental?
5. How has healthcare market responded to these new inventions?

2. IMPLEMENTATION

1. Predictive tools:

Currently there are no officially approved apps for predicting the depression. The scientists who are working in Vender bilt University, created machine learning algorithm (Paywall) that uses medical records of approximately 5000 hospital patients, like their personal information and their medical history, from this information the algorithm will predicts the likelihood of patients suicidal behaviours. The accuracy of the algorithm is up to 84% for predicting the patient's depressive/suicidal thoughts within a span of week [2]. Most of the ML algorithms uses Support vector machine (SVM), Classification algorithms, Clustering methods. The scientists are really hoping to see their algorithm to be used by worldwide.

2. Virtual conversational agent for treatment:

Clinicians and developers come together to create conversation agent for patients which will help them to defeat their anxious thoughts. These conversational agents are particularly based on Cognitive behavioural therapy (CBT). CBT mostly focuses on challenging and changing unhelpful behaviours and improving the patient behaviour. It uses Artificial intelligence and machine learning algorithms as a base tool which helps to train the system on each conversation with user. It uses natural language processing for communicating with the user and extracts the information from chats for further using in algorithm. Conversational agent has many forms – textual, audio/video, virtual human interaction.

2.1.**Woebot**: The first mental health chatbot woebot was created by Dr. Alison Darcey in 2017. It normally uses text as a communication interface. This chatbot gives a step-by-step guidance to the user with the help of CBT apps to help user minimizing his stress levels and create more positive thoughts towards life. Before launching this software into market they take 2 weeks trial on college students with age group of 18-28 years. Result of trial shows most of the students feel decrease in their depressive thoughts [3].

While on the other hand some early stages of this study shows increased level of depressive thoughts on long term uses, but it is still unclear [3].

2.2. **Wysa**: It has some additional benifits over woebot. It provides online coaching sessions with psychologist if the user seeks for extra help. The UI provided by wysa is more users friendly. It gives user different choices of self care exercises, from which user has to choose the required exercise for him.

3. Patient monitoring system:

Patient monitoring system involves actual therapists and doctors to look over patient information. It has three components- therapist monitoring system, patient monitoring system and knowledge derived in the form of patterns from previous two systems.

The doctors have all the records of patients including their medical history and daily activity, they passively monitors patients/users mental condition with the help of system. If system found any changes in behavioural pattern it will be seen by doctors so they could easily reach out to help their patient before things gone worse. These systems take behavioural information about patients such as daily or weekly self assessment; ask about internet or normal activity on mobile, travel etc. Generally the factors for collecting behavioural information

from patient are not exact one, but usually these systems track following information from users:

1. Exercise and sleeping patterns
2. Their current movement and location
3. Self assessment tests
4. Data collected from text messages
5. Mobile activities

Some of the patients monitoring systems which are used in market are:

1. Ginger.io
2. Mindstrong
3. Marigoldhealth

These apps provide live conversation with the therapists to seek better treatment in coaching sessions. The moderators do not read each message typed by patient. Natural language processing uses sentiment analysis and finds out the concerning chats of patients with the system and forwards it to the moderators. The mindstrong app keeps tracks of user mobile activity- speed of typing, scrolling, swiping etc. And keep the measurements.

3. FACTORS FOR CONCLUSION

1. Application accessibility:

The current situation in India is there are only 3 Psychiatrists over 10,000 people, which is 0.75% [4]. And currently there are 400 million users who own their personal phone. So accessing these apps will help in those lengthy and moreover costly visits to the therapists to metropolitan cities. It will also help to enable over-burdened mental health professionals to reach to their patients easily and provide services.

So these apps are effective for those patients who enable to access traditional mental professionals for variety of reasons. Procedure for accessing the apps is also very easy to understand.

2. Privacy and security of patients information:

Mental health information of patient is very sensitive topic. These apps always first ask for users consent before using any personal information regarding them. Still there have been lots of medical scandals happened by misusing the medical data, so they must earn and ensure the trust of patient's privacy and do not leak available information. So there are still conflicts about privacy and security issues. And privacy and consent are related to each other, maybe patient has given primary consent over using medical notes or prescription that does not mean he is also agreed to give consent for sharing audio/video forms of data. So the system will always have to ask for users consent.

3. Social Impact:

In India mental health is still considered as a taboo and people don't want to talk about it publically, this is still considered as a stigma around society, these apps are not part of any cultural norms and expectations, they are mostly non judgmental, non opinionated and neutral. People in Society are still not fully aware with these new technologies, a little push is needed towards proper awareness among peers. Also India is demographic country where culture, language differ from one place to another. So, any app which is based on speech patterns, language to diagnose the mental health information from one place may create false result when it is used in another place.

4. Impact on patient and doctors:

Users who have used these apps for their treatment have very positive review for it. The trials which are conducted by these apps show both positive and negative impact on patients. More research is still required in this field for proper treatment of patients. Same app will be downloaded by different patients who are facing mental health issues, so determining the benefit

and harm of each app on two different people having different type of issues is difficult. These apps are beneficial for people – who cannot afford actual therapist, people who feel little uncomfortable visiting actual clinics, people in rural areas where reaching the physical therapist is almost impossible.

According to global survey of doctors, 48% doctors felt that AI/ML will have no or minimal impact on psychiatrists over next decade, and 3.8 % think that these technologies will be overtake them in the future by making them obsolete. Also they believe that there is moderate or minimal chance that technology will provide more care than the psychiatrists. They are more concerned about potential risks about these future technologies. One of the review from the doctors was "There is a stigma associated with mental health treatment already and am not sure how talking to an AI would help the treatment process at all" [5].

5. Economical impact:

There are many companies, mostly start-ups who are using AI and Ml in their products for helping the patient to overcome depression. The investment cost needed for implementation of these apps is higher Considering India's per capital spending is relatively small as compared to developed nations, and mostly patients may not opt to go for advanced analytical apps for their mental conditions. Still these apps have gain more popularity in healthcare market and count of users who are responding to it also very satisfactory. The conversational agents like youper, wysa, woebot have more than 1 million downloads and positive reviews on playstore. Helping the patient should be the first priority for clinicians; the idea behind these applications is to find a therapist for potential patients. But this does not mean that business model should begin prioritizing pushing patients towards therapists instead of actually realizing they need one or not.

6. Legalization of apps:

Regulation of mobile apps is significantly less than regulation of medical products and treatments. Most of start up companies creates apps in the name of inventions each day, but in the case of mental health apps it is strictly required that those pirated apps which are currently available to users on google platform should be legally verified by medical council. The apps like woebot, ginger.io, youper are at least approved by some clinically safety standards but not all of them. Some applications are created only for pilot studies and trial. The disadvantage of non legalized application is it provides very poor quality information to the user and thus posing risks to patient's mental health by providing harmful recommendations. So for official legalization these applications have to prove their stand and improvise their accuracy towards patient's health. In UK, NHS (National Health service) has came forward for helping these apps by creating 'NHS Digital Apps Library' which has NHS Approved labels for them by creating a proof of their safety and usability.

7. Technological impact:

AI and ML both are emerging technologies which are used to train the system by collecting more and more dataset to minimize the errors. In this technological world, people encourage new technology but when it comes to using it, they still step back by fear and insecurities. Another challenge is natural language processing for text and speech recognition. At moment, these apps are learning only English, and mostly dependent on preselected short descriptions for users. If the user interacts with slightly short forms or different language conversation, the system does not understand it. So to make them more useful they have to focus on removing the language barriers by trying to do more development in

communicating multiple languages to reach multiple users.

4. CONCLUSION:

These new technologies are still in their early stages of development, they required thorough research to ensure the proper treatment and safety of patients. Mostly these apps are useful for minimal to mild conditions of depressive thoughts of users to help them curing it, but they are not replacement for actual in person medical therapy. Also In severe conditions patients should not rely on them and seek medical help. It is true that these technologies has more positive effects than negative effects, they help therapists to reach out for his patients through online access and patients also giving positive response towards this new innovation. To get accepted by medical field these technologies have to work hard on treating patients. If they do, there might be a window that medical field will legally use them in psychiatry.

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Smart Attendance using Face Recognition

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Abstract: *For reducing human efforts world is turning more towards automation to make the process smart and reliable and striving for the same. A face is one of the easiest ways to recognize an individual's identity. Face recognition is a personal identification system that uses one's own attributes to identify one's identity. The process consists of two stages, namely the acquisition of faces, in which the process occurs very quickly in humans, except in cases where the object is located at a distance and recognition of the human face. The power of the human mind to recognize certain people is amazing. It's amazing how the human mind can continue to target certain people over time, despite the slight change in appearance. This paper presents an approach of face identification using Local Binary Pattern Histogram (LBPH) method and Haar-like features.Step one is detecting a face which is done using Haar cascade classifier. After detection of face, it is stored in the database. Then the faces are fetched from the database and passed through the recognition algorithm. The algorithms were tested in Python with OpenCV library. The results of the experiment show that Local Binary Pattern features are most efficient and reliable for the implementation of a real-time face detection system.*

Keywords: ***Face Detection; Haar cascade; Local Binary Pattern Histogram; Face recognition; Haar Features***

1. INTRODUCTION

In the last few decades, a lot of research has been done to find face recognition. We can recognize a human face without the help of a human being. In this paper, a system is used to evaluate the detection of human faces. The model that can be used on various devices to obtain digital images is called face recognition. It is a particular case of face detection, searches for the vectors of all features related to a given category. The main focus of this model will be on the availability of front faces. In this face detection model, it first determines the population expectations by first looking at all the district regions in a gray dotted frame or image. The value of the element thickness is determined based on its guesses on the eigen surface. After many iterations, the symmetry of the face is determined and the presence of various facial features is evaluated and confirmed. In other terms, we call face labeling as the facial focus in AF (automatic focus), the function that detects the human face for focus will be set as well as the appropriate exposure.OpenCV will be used to detect faces.

2. BACKGROUND

This study domain is an important part of our research paper. It provides the context and purpose of the research. There is therefore a need for a background study that has an impact on the preparation of the proposed system. Detection of Face and Recognition of Face are both are two different concept:

- **Face Detection**: it aims to determine the face (location and size) in an image and possibly extract it for use by the facial recognition algorithm.

- **Face Recognition:** with images that have already been facial extracted, cropped, changed size and often converted to graycale, the facial recognition algorithm is responsible for finding the features that best define the image.

2.1. Face Detection

Face detection with the Viola-Jones algorithm is the most commonly used method due to its high detection rate and fast processing speed. We can summarize the algorithm in four steps: feature selection, feature evaluation, feature learning to create a classifier, and cascading classifiers. OpenCV fortunalely already has Two pre-trained classifier for face detection. The 2 classifiers are Haar Classifier and Local Binary Pattern(LBP) classifier.

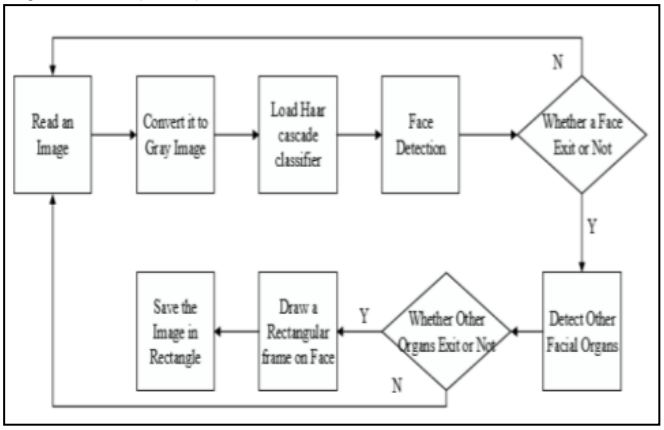

Figure 1. Figure Label Face Detection Flow Chart

2.1.1. Haar feature-based cascade classifiers

The Haar Cascade classifier uses a computer-aided detection system i.e, a machine learning approach that can process images at high speeds and achieve high detection rates. This can be caused by three main reasons: Haar classifier implements the 'Integral Image' concept which allows the detector features to be integrated very quickly. The learning algorithm is based on AdaBoost. It selects the smallest number of important features in a large set and provides the most efficient classifiers. Complex classifiers are merged to create a 'cascade' that eliminate non-face regions within an image, thus spending more estimation on favorable object-like regions.
Now let's try and understand the working of algorithm in steps:

2.1.1.1. Haar features' extraction

After enormous amount of training data (in the form of images/pictures) is fed into the system, the classifier starts by extracting the Haar features from each image/pictures. Haar features are a type of convolution kernels that essentially detects whether an appropriate factor is present in the image or not. Beloware some pattern of Haar features:

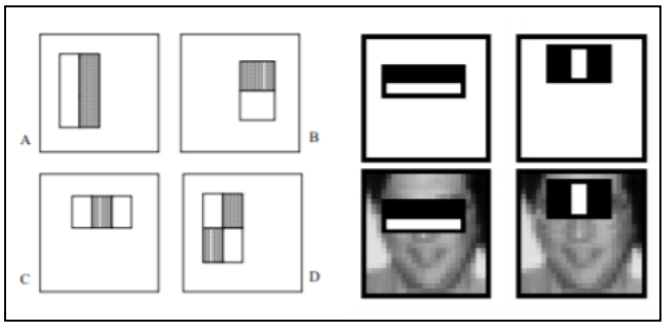

Figure 2. Rectangle features shown respective to the enclosing detection window.

2.1.1.2. 'Integral Images' concept

The algorithm proposed by Viola Jones uses a window size of 24X24, which would result in the calculation of over 180,000 features in this window. Consider calculating pixel differences for all features? The solution made for this incredibly complex process depends on the concept of Integral Image. Meaning of an integral image is that to find the sum of all pixels under any rectangle, we simply need four values in the corner.

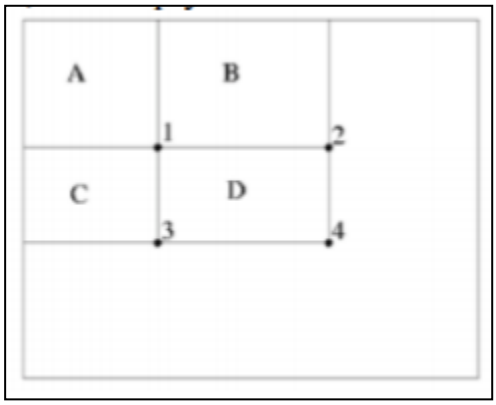

Figure 3. Integral Image

The total sum of the pixels within rectangle can be calculated with references of four array. The integral image value at location 1 is the sum of the pixels in rectangle. The localized 2 is A + B, at location 3 is A + C, and at location 4 is A + B + C + D. The sum within D can be computed as:Sum = D + A - (B + C) 4 + 1 - (2 + 3) This means that, to calculate the sum of pixels in any feature window, we do not need to compile them individually. All we need to do is calculate the integral image using 4 values.
The example below will make the process visible.

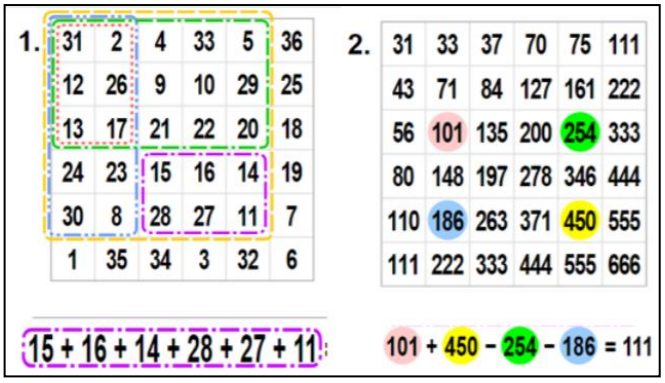

Figure 4. Integral Image Calculation

2.1.1.3. 'Adaboost' : to improve classifier accuracy

As mentioned above, more than dollar 180,000 features values appear inside the 24X24 window. However, all the above features are not useful for face identification. For only select- ing the best feature for the entire chunk, a machine learning algorithm called Adaboost is used. What the algorithm does is, it actually selects only those features that help improve the classifier accuracy. It does it by building a strong classifier which is a high-quality linear combination of many weak classifiers. This reduces the number of features significantly to 6000 from 180,000. 4. Using 'Cascade of Classifiers' One way that Viola Jones makes sure that the algorithm works quickly is to use the cascade of classifiers. The diagram below can conceptualize as follows,

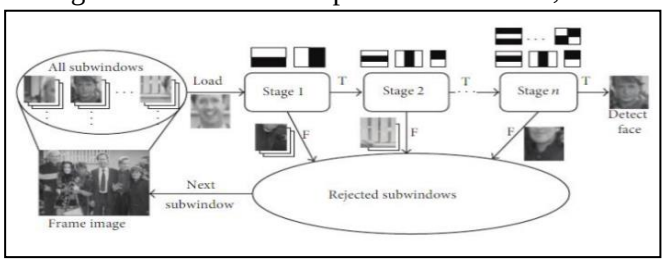

Figure 5 : Cascade Structure for Haar Classifiers

2.2. Face Recognition

Face detection systems can work basically in two ways:

2.2.1. Authentication or verification of a facial image: basically compares the input face image to the user-related face image that needs to be authenticated. It's basically 1x1 comparisons.

2.2.2. Facial recognition or Identification: basically compares the input face image with all face images from a dataset with the aim of finding the corresponding user for that face. It is basically a 1xN comparison.

In our project we used the oldest (not the oldest) and most widely recognized facial algorithms: Local Binary Pat- terns Histograms (LBPH). Local Binary Patterns Histograms (LBPH). Local Binary Pattern (LBP) , texture operator is simple which works very efficiently by labeling the image pixel by thresholding the neighborhood of each pixel and considers the result as a binary number.

Let's see the further steps of the algorithm:

1. Parameters: 4 parameters are used by the LBPH:

- Radius: radius is used to create its own spherical pattern and represents radios around the center pixel. Usually set to 1.
- Neighbors: the number of sample points to form its own binary pattern. Remember: the more sample points you add, the greater the cost savings. Usually set to 8.
- Grid X: the cells number in the horizontal direction. The more cells, the more efficient the grid, the greater the dimensionality of the feature. Usually set to 8.
- Grid Y: the cells numbr in the vertical direction. The more cells, the more efficient the grid, the greater the dimensionality of the feature. Usually set to 8.

2. Training the Algorithm:

First, we need to train the algorithm. To do so, we need to use a dashboard with face images of people we want to see. We also need to set the ID (either a number or a person's name) for each image, so the algorithm will use this information to find the input image and give you output.

3. Applying the LBP operation:

The first step for LBPH is to creating a central image that describes the original image in a better way, by highlighting facial features. To perform this, the algorithm uses the concept of sliding, based on the radiation on the part of the neighbor and neighbor. The image below illustrates this process:

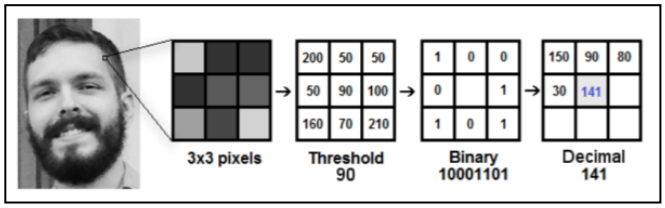

Figure 6 : LBP Operation Based on the image above, let's break down a few simple steps to understand it more easily:

- Let's say we have a picture of a face in grayscale.We can get part of this image as a 3x3 pixel window.
- It can also be represented as a 3x3 matrix containing each pixel thickness (0 ~ 255).
- After that, we need to take the median value of the matrix to be used as a limit.
- This value will be used to define new values from 8 neighbors.
- For each neighbor of the median value (limit / threshold), we set a new binary value. We rank 1 for values equal to or higher than the limit and 0 for values
- lower than the limit.
- Now, the matrix will contain only binary values (ignoring the median value).
- We need to convert each number of binary options from each position from the line matrix to a new binary value (e.g. 10001101).

- Note: some authors have used other methods to create binary values (e.g. clock direction), but the

  end result will be the same.
- Then, we convert this binary number to decimal number and set it to the median value of the matrix, which is actually a pixel from the original image.
- At the end of this process (LBP process), we have a new image that better illustrates the features of the original image.
- Note: The LBP process use a different extended amount of radius and neighbors, called Circular LBP.

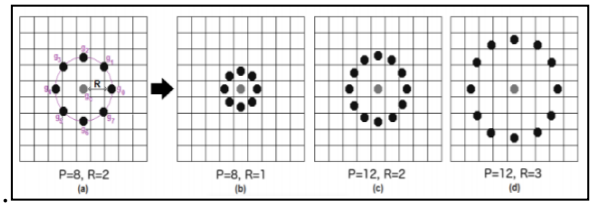

Figure 7 : LBP Operation

It can be done using bilinear translation. When a specific data point is between pixels, it uses values from 4 adjacent pixels (2x2) to estimate the point value of the new data.

4. Extracting the Histograms:
Now, using the image produced in the last step, we can use Grid X and grid Y parameters to split the image into multiple grids, as can be seen in the following image

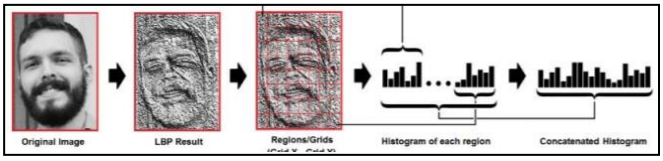

Figure 8 : Extracting the Histogram

Based on the image above, we can generate a histogram for each region as follows:
Since we have an image in grayscale, each histogram (from each grid) will have only 256 positions (0 255) representing the output of each pixel.
After that, we need to convert each histogram to create a new and larger histogram. Assuming we have grids i.e of dimension 8X8, we will have 8x8x256 = approximately 16.384 positions in the final histogram. The final histogram represents the characteristics of the original image.

5. Performing the face recognition:
In this step, the algorithm is already trained. Each generated histogram was used to represent each image from the training dataset. Therefore, given the input image, we take steps again with this new image and create a histogram that represents the image.

- So to get the same image as the input image we just need to compare the two histograms and replace the image with the nearest histogram.
- We can use different methods to compare histograms (to calculate the distance between two histograms), for example: euclidean distance, chi-square, total, etc. In this example, we can use the Euclidean distance (best known) based on the following formula:

$$D = \sqrt{\sum_{i=1}^{n}(hist1_i - hist2_i)^2}$$

- So the output of the algorithm is the ID from the image with the nearest histogram. The algorithm should also return a calculated distance, which can be used as a measure of 'confidence'. Note: do not get confused by the word 'confidence', as lower secrets are better because it means that the distance between the two histograms is close.
- Then we can use the margin(threshold) and 'confidence' to auto-measure once the algorithm has correctly displayed the image. We can say that the algorithm has seen successfully when the confidence is lower than the defined threshold.

3. Literature Survey

1) **Automated Attendance System Using Face Recognition Through Video Surveillance Observations:**

Abstract:

The purpose of this program is to introduce an automated face recognition system to a person in real-time for an orga- nization to mark the attendance or their employees. The work done describes the automation arrivals program using video surveillance.

Proposed Algorithm:

This paper uses the Viola and Jones algorithm to find face detection and communication methods for face recognition. The Viola and Jones algorithm is used for face detection. When applied to both the process of creation and recognition of the face. In the event that you create a database it takes the image of the web camera installation continuously. Photographs captured receive face recognition. The recovered faces will be presented and stored in the database.

2) **Implementing Automated Attendance System Using Face Recognition:**

Abstract :

Authentication is a visible problem in program management in computer-based communications. This paper describes the Student Arrival System ap- proach that will integrate face recognition technology using the Personware (PCA) algorithm. The system will automatically record the attendance of students in the class room

Proposed Algorithms:

This paper uses the PCA (Feature Analysis) technique for facial recognition and image reduction. The implementation of this function is performed using OpenCV libraries to obtain facial access and other processes. The PCA method has been widely used in programs such as face recognition and image reduction. PCA is a standard method for detecting patterns in data, and has presented data as an eigenvector to highlight the similarities and differences between different data. After that the launch of the program is divided into three major parts for Face and Extract, Read and Face Trains, Visualization and Identification

4. Proposed Work

In our project we aim to develop a system for capturing attendees using face recognition technology in the classroom and creating a good database for recording. The block diagram describes the proposed Face Recognition based class Classifi- cation scheme. The functionality is briefly described below:

4.1. Camera Capture

The camera is mounted in the classroom to capture the stu- dent's face. The camera should be a place where it captures the faces of all actual students. This camera must be compatible with a computer program for further processing through a network or wireless cable. In our example we use a built-in laptop camera.

4.2. Image processing

The face recognition algorithm is applied to the captured image. The image is cropped and saved for processing. This module recognizes images of the students in question who are registered with their names and ID numbers in the database.

(a) Train Database. At first we took a picture of the faces of the enrolled students. This data is later applied to the facial recognition algorithm. Performed using image acquisition. All face resolution images have been enlarged to 240 X 300 image.

(b) Face detection and Cropping. The pictures taken in class are initially scanned to find faces. This is done using the view of the display.CascadeObjectDetector (). This function oper- ates on the basis of the Viola-Jones algorithm. This algorithm focuses heavily on speed and reliability. The damaged face was shaken and restored to a 240 X 300 image, similar to train data.

(c) Face Recognition. For recognition, feature areas are integrated and faces are applied to the eyes and the moon in xed locations. Face recognition is then performed using the LBPH algorithm and the faces are grouped together based on the probability of the game.

4.3. Recordings of Attendance

Use the Excel spreadsheet to keep track of the number of people arriving

5. CONCLUSION

Face recognition is a matter of machine learning and patternrecognition. This is often used in a variety of ap- plicationsto authenticate and control secure access because of theirunity. The proposed work is dedicated to designing and im-plementing a facial recognition model that accepts fragmentedor complete facial images to identify facial fea- tures. In thiscontext a three-step process is proposed to work where firstthe facial features are divided into multiple facial features.Secondly the images are processed to extract the feature and itis therefore proposed to use the LBPH algorithm. Finally face-to-face training, classes and trained model is used to recognizefaces. Recently the proposed model has been implemented andits functionality is provided

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