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DANGER PREDICTION AND ASSISTANCE SYSTEM

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Abstract: Safety app is machine learning based android application that is designed for notifying users of the potential threat around them. It is a SOS application that sends alerts to emergency contacts along with the location using Google map. The user gets the notification when their location is predicted by the algorithm to be prone to danger. This application works on factual data and not on objective data received by the users. Another feature of the application includes providing the location to nearest safe places. The application has easy to use GUI hence efficient for users of all age groups. The main advantage of the application is the alert sent to the user, as during the time of distress the user won't have to find the application in order to send SOS rather the app does that for the user only on one click on the alert message.

Index Terms **- Machine learning, Data Science, Android app Development, Crime Prediction**

1. INTRODUCTION

In 2015, there were over 300,000 reported incidents of crime against women. As per the National Crime Records Bureau (NCRB), 2,44,119 cases of robbery, theft, burglary, dacoits, among others, took place in residential premises in 2017. With such a scenario around the country we need a solution to reduce these crimes. And the best solution is to use the advancements in technology and predict the probability of crimes happening and prevent them.

The Safety app could be a perfect solution as it uses data from authentic sources and predicts probability of a crime happening at any place at any particular time. Also it ensures the safety of one's phone as it sends the last detected location. Finally it is a SOS application that has different levels of severity of SOS messages that could be sent to the chosen emergency contacts based on the severity of the distress faced by the user.

2. CURRENT SYSTEM

2.1 RELATED WORK

Raksha, Eyewatch Women and My Safetipin are few of the safety apps that are available on play store assuring women safety. These apps are equipped with buttons to send SOS to few contacts on one click. These SOS in these apps can also be activated through gesture.Few provide the feature to record voice once the SOS is activated. Though these apps provide good features for one's safety there are a few limitations. Most of such safety apps are focused on elderly or are women centric. As stated in reviews of these apps, they work on the 'tracking upon alert' model. That is, once the SOS is sent, the location of the phone is traced and then help is sent to the location for the person in distress. This proves to be very time consuming. Another limitation is that the SOS messages could be sent by mistake, on just fiddling with your phone. And the contacts receiving the message would start asking for help from police, hospital etc. Therefore wasting time and resources. Also these apps have a SOS which is common for all situations. Hence the severity of the distress cannot be known and who to call for help cannot be determined. Few of these apps, for example, My Safetipin App Depends on crowd-sourced data. The app asks the user if they feel the location is safe or not. This data is subjective and not factual. Which might mislead others using the app.

3. PROPOSED APPROACH

3.1 FEATURE 1-SOS

The app has a SOS system that allows the user to send a message to their family or friends and tell them that "I am not feeling safe" and this will be a gesture base SOS.

This feature also provides levels according to how unsafe you are feeling, whether you are feeling that someone is following you or you are driving on a street with low gas and there is no one else around you or maybe someone attacks you and tries to snatch or try to robe you. According to the level of your emergency, you can send a message.

3.1.1 LEVEL 1

In level one, the emergency message will be sent to your emergency contact list which consists of 5 people and also sends a message if you recommend. It will send a message with your current location.

3.1.2 LEVEL 2

In level 2, it will send a message with higher alert and your location, it also provides users a safe place like the police station or hospital where user can go and get help.

3.1.3 LEVEL 3

This is the most dangerous situation and it may be the situation of severe damage. In this, emergency message will be sent to the nearest police station or if the user will select the medical it will send a message to the hospital and the emergency contact list and also the siren will get activated. And if the phone gets switched off at this time another message will be sent with the last location of the cell phone.

3.2 FEATURE 2-CHARGE

This will send the notification to people that are chosen by the user when mobile is discharged with the last location of mobile so the last location of the user can be used in case of a distress situation. In many cases it may happen that the user forgets where they last placed their phone. This feature will help the user in such scenarios hence providing safety for the phone.

3.3 FEATURE 3-DANGER PREDICTION

We use a machine learning algorithm which predicts if a user is in danger and notify them beforehand depending on the type of danger. Such as Accident-prone area, Robbery, rape or snatching. So that the user will get alerted and can take precautions accordingly and send a SOS using the alert message directly.

3.4 FEATURE 4-ASSISTENCE

This will help the user if their car were broken in middle of the road or the user is out of gas, it will show the nearby gas stations and garages for their help.

4. DATASET

I got the dataset from [1] and found it appropriate. I started with pre-processing of the data in the dataset. Firstly I cleaned the data and removed superficial Columns.

5. WIRE FRAMES

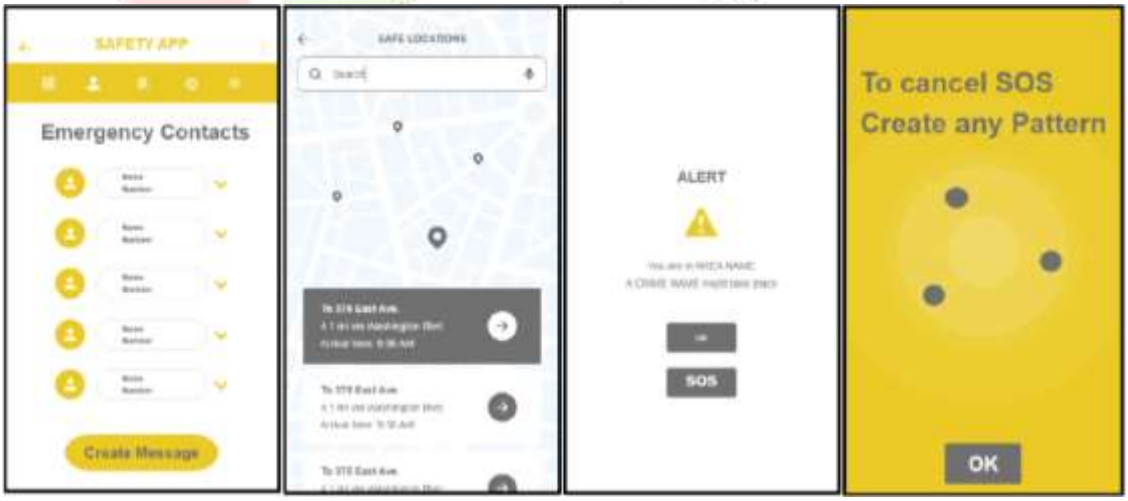

Figure 1. Application Wireframes

The app has an easy to use GUI. The navigation bar allows the user to access all the features of the app at any point of time. The app starts with a registration page which briefs the user about the functionalities of the app and allows them to register themselves using just their name and number. Once registered, the user is directed to the contact selection page. Here the user can access their contact list and can add their emergency contacts using '+' icon. Once the contacts are selected the user can view their top five Emergency contacts on the next page where they will also be allowed to edit or remove any contact if they wish to. Next the user is sent to edit their emergency

message. Here the user can change their emergency messages to be sent to their contacts; also this page informs the users of different levels of SOS that can be sent through this app. Once the contacts are selected and message is entered by the user the app gives a confirmation that the user has successfully completed the steps. From here the user can either move to the map to know their current location, nearby safe places, or close the app. Whenever the user goes to the maps, they are shown their current location. From here they can search for safe places using the search bar provided according to the situation they are in. Based on the search of the user the nearest locations will be shown and on selecting on any of those places the user can see the entire way to each there. Also whenever the app predicts any threat around the user, an alert message is sent even if the app isn't running in foreground. The alert notification consists of two buttons: 'ok' and 'SOS'. If the user feels unsafe they can select the SOS option which directs them to choose the severity of the situation. On choosing the level of severity the message is sent. The user knows what each level means from the page where they edited their message. If the user is safe, they can press ok and the alert message will close. This alert message saves a lot to time as the user does not have to open the app in case of an emergency. They can use the alert message or the gesture to send the SOS. If the gesture is wrongly activated the app shows a page with few dots and asks the user to create any pattern and stops the forwarding of SOS. User can also search nearby mechanic or gas station or hospitals. App will send the notification to them who are on priority list or to the police station or hospital nearby.

6. DATA VISUALIZATION

6.1 DISTRICT CRIME FREQUENCY

Figure 2. District Crime Frequency

In this, we firstly distinguish data by offence code and then apply distribution graph on single offence code to find the frequency of crime occur on any peculiar place.

From this graph, we can interpret that which area is more susceptible for code 615 in this we can see that district B2 is most susceptible for code 615.

And by applying it of each data set we can get the idea that which city is more susceptible for which danger.

6.2 DAY WISE CRIME FREQUENCY

It is the same process as but is split by days of the week so we can get that which day is more susceptible to which danger so we can use this information in predictions, on which day in a peculiar district user will face which types of danger.

This is also a distribution graph showing the frequency of danger based on their location on any particular day.

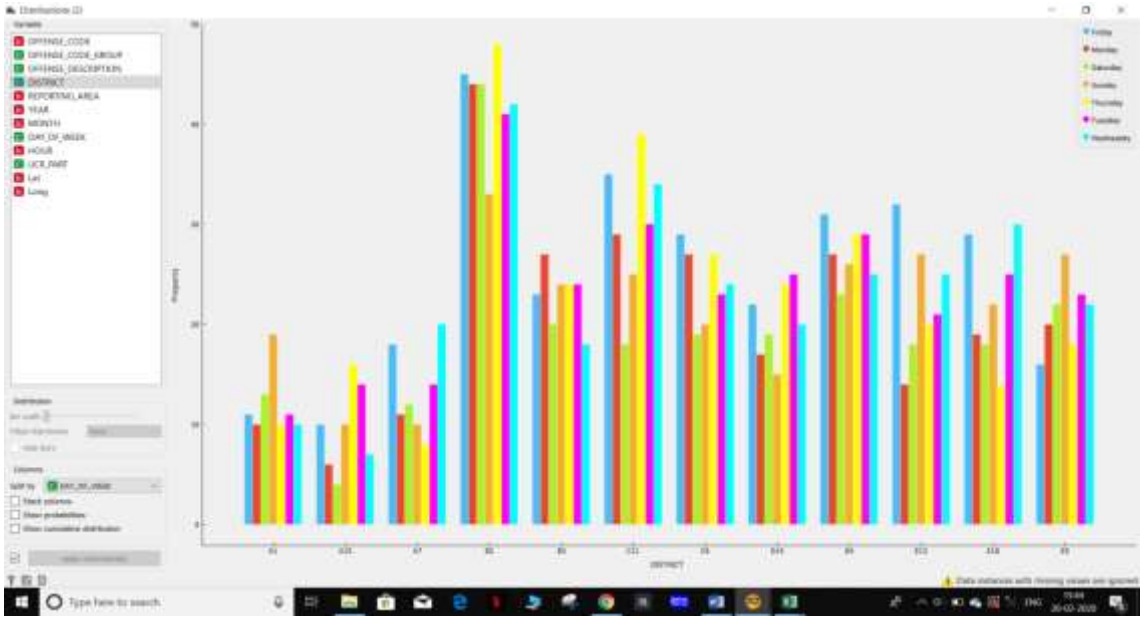

Figure 3. Day Wise Crime Frequency

6.3 OFFENCE CODE FREQUENCY

Figure 4. Offence Code Frequency

This graph represents the frequency of each danger on each district so we can get the idea in which district we should of which danger so that we can use this data and predicts, the danger that the user should get alert based on the location of the user.

7. ALGORITHMS

After get done with visualization, I've move to application of the machine learning algorithm on the data set that will predict the danger. I applied several algorithms to compare which is more efficient. For that I applied different types of algorithm on the data set.

After compare several algorithms the results show that random forest algorithm showing greater accuracy. I applied different algorithms like logistic regression, tree algorithm, SVM(Support Vector Machine). and random forest is most accurate among all the others. I also refer different paper to study about different algorithm and to fetch which algorithm will be more suitable for the data set[6] [7]

8. RESULTS

8.1 RANDOM FOREST

Random forest algorithm is the supervised algorithm and it is used for both classification and regression and random forest algorithm creates decision trees on data samples and then gets the prediction from each of them and finally selects the best solution by means of voting.[5]

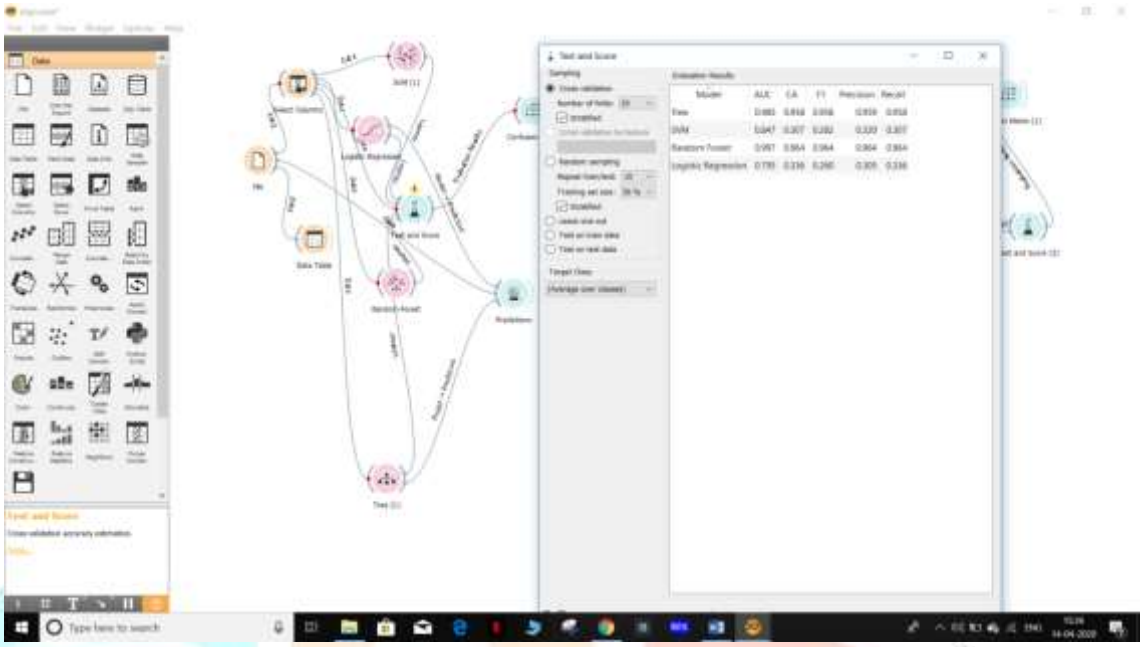

Figure 5. Accuracy of Algorithms

As we can see here that random forest is providing highest accuracy among all others.

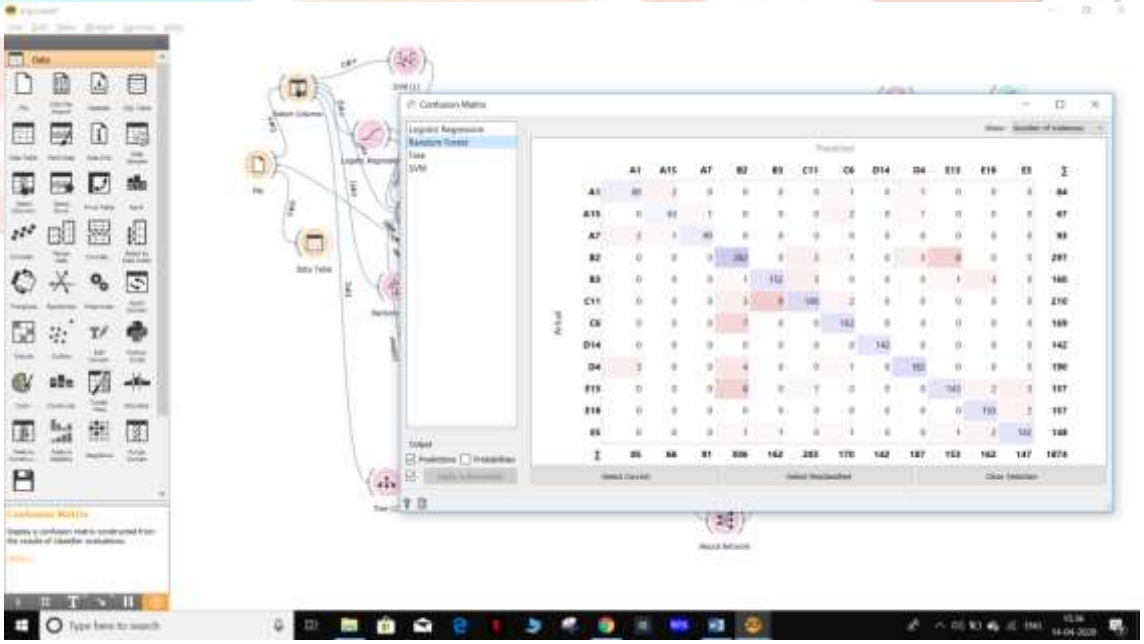

Figure 6. Confusion Matrix of Random Forest

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CONCLUSION

To conclude, I would want to mention that this project may help the user to become more safe and get more awareness of upcoming danger so that they can take appropriate actions. And, even if something bad happens, the user can go to the nearest safe palace. This app will also help the people who are not in danger but just a car damage and other things.

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