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Road Accidents Prediction and Classification

Asst. Prof. Syeda Badrunnisa Begum[1], Shaheen Naikar[2], Ashwini B[3], Marilinga Y[4]
[1, 2, 3, 4]*Department of Computer Science and Engineering, Ballari Institute of Technology & Management, Visvesvaraya Technological University, 583104 Ballari, India*

Abstract: ***Road accidents leads to death, disability and hospitalization of people across world which leads to loss of potential income of individual and also affects the economy of the country. For every 10 people killed during road accidents across world one person belongs to India. In year 2020, total of 3,66,138 road accidents occurred leading to loss of 1,31,714 persons lives, injuring 3,48,279 persons. Number of road accidents and damage caused by it can be reduced by identifying the factors leading to it. In this project, we are applying the concepts of data mining and machine learning to identify the various factors that affect road accidents and its severity. The application will take variety inputs such as age of vehicle, light condition, road surface condition, speed limit etc. and will use random forest machine learning algorithm to calculate the severity of a possible accident. The severity of a possible accident will be displayed on a scale of 1 to 3, 1 being the highest and 3 being the least severe so, that they drive safely and take precautions. This data can be used in future to analyze inputs and improves the accuracy of the system output. In case of severity 1 which is the case of possibility of fatal accident an alert message will be sent to police so that they can take any preventive measures and therefore this application can prove to be very helpful in reducing accident fatality rates in the country.***

Keywords: Road Accident, Economy, Severity

I. INTRODUCTION

This template, modified in MS Word 2007 and saved as a "Word 97-2003 Document" for the PC, provides authors with most of the formatting specifications needed for preparing electronic versions of their papers. All standard paper components have been specified for three reasons: (1) ease of use when formatting individual papers, (2) automatic compliance to electronic requirements that facilitate the concurrent or later production of electronic products, and (3) conformity of style throughout a conference proceedings. Margins, column widths, line spacing, and type styles are built-in; examples of the type styles are provided throughout this document and are identified in italic type, within parentheses, following the example. Some components, such as multi-leveled equations, graphics, and tables are not prescribed, although the various table text styles are provided. The formatter will need to create these components, incorporating the applicable criteria that follow.

II. OBJECTIVES

1) To design a framework that can get trained and extract the features from the large existing dataset.
2) To develop a probabilistic model that can predict the crash from the learner features.
3) To compute the efficiency of the proposed mode.

III. FUNCTIONAL REQUIREMENTS

1) Importing dataset, cleaning it, identifying missing values and normalizing data.
2) Splitting dataset into training data and testing data.
3) Initially tried implementing model using random forest algorithm, logistic regression algorithm, decision tree algorithm and applied hyperparameter tuning to check which gives higher efficiency.
4) Random forest algorithm gave higher accuracy and hence model is implemented using it

IV. NON-FUNCTIONAL REQUIREMENTS

1) *Scalability:* Machine Learning algorithms can process large number of classification parameters and are able to obtain useful patterns. It can process huge amounts of data efficiently and can be scalable.
2) *Performance:* Model is implemented using random forest algorithm which gave higher efficiency when compared to, logistic regression algorithm, decision tree algorithm and applied hyperparameter tuning.

V. DESIGH

We have developed a web-site for our model. It has four major components, they are:

1) *Front-End:* User entered inputs are taken and sent to the back end for processing.
2) *Back-End:* The user entered data is process here using machine learning model to identify the severity of accident. The machine learning model is deployed here.
3) *Machine Learning Model:* Machine learning model is implemented using random forest algorithm as it showed highest accuracy when compared to other algorithms. It is deployed on the backend. It processes user entered data and predict the severity on a scale of one to three: 1 being fatal, 2 being serious and 3 means slight chances of accidents. The predicted output is displayed to the user on the frontend. If the predicted output is 1=fatal then, an alert message will be sent to police so that they can take appropriate actions. The alert message will contain coordinates of the location of the user.

A. System Design

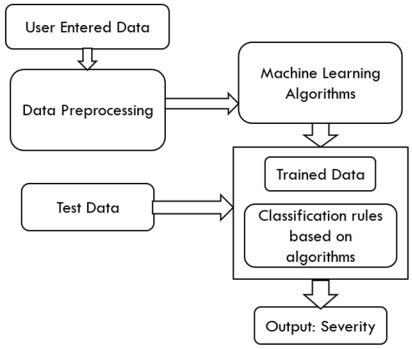

Figure V.1: System design

VI. RESULT

The home page that is the front end as shown in figure VI.I will take inputs from the user. The data collected from user involves age of driver, vehicle type, age of vehicle, engine capacity, day of week, weather conditions, light conditions, road surface conditions, gender and speed limit. For this user entered data output is predicted in terms of severity of accident.

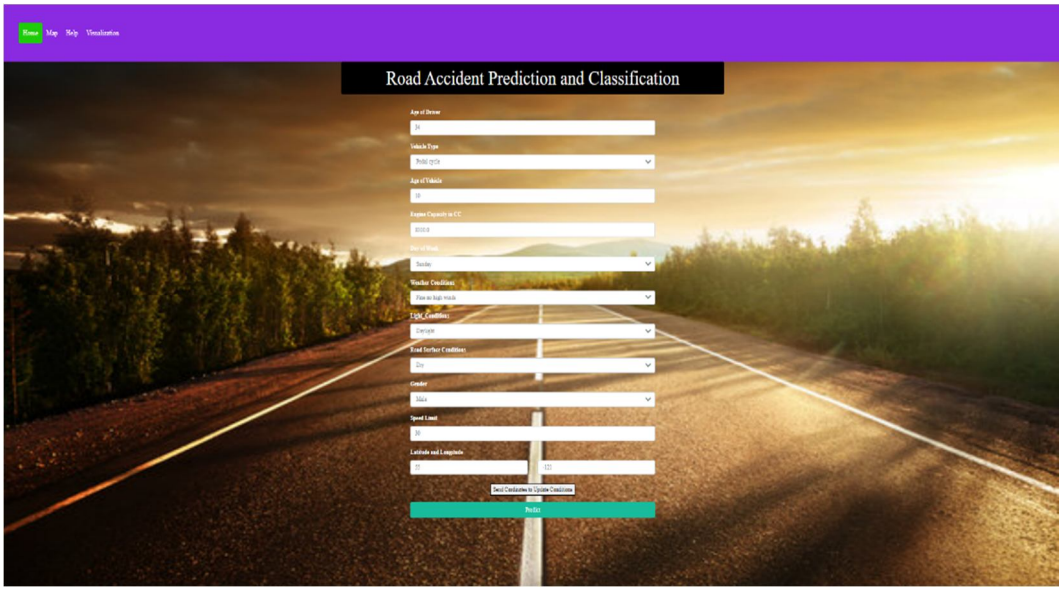

Figure VI.1: Home page

When the user clicks on Predict, user entered data is sent to the backend, where it is feed into Random Forest machine learning algorithm. The output is shown in figure VI.2.

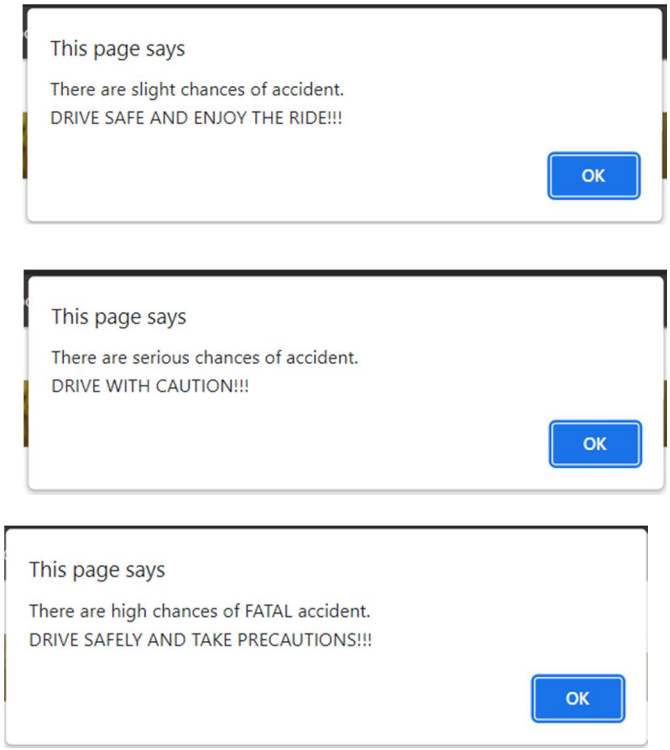

Figure VI.2: Output

The user can call to helpline services in emergency conditions using the helpline numbers provided in help section as shown in figure VI.3.

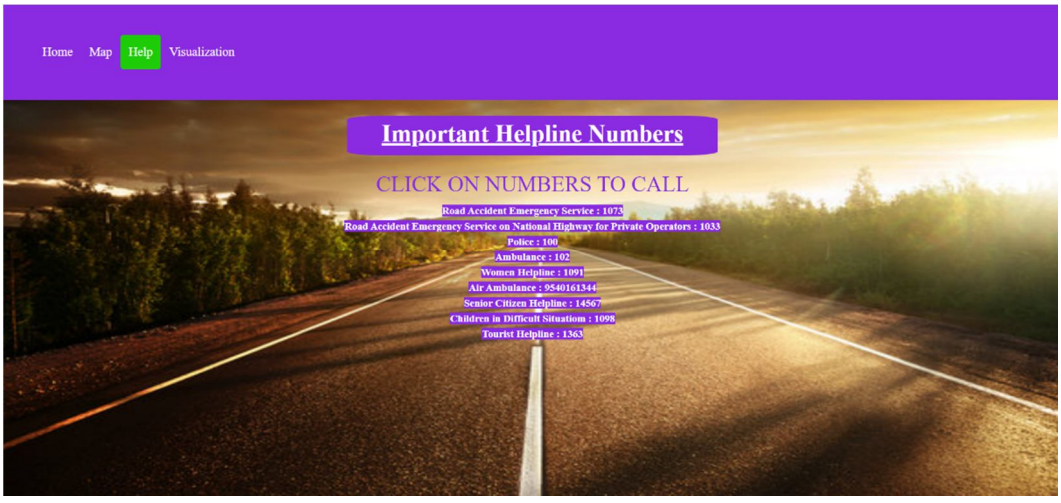

Figure VI.3: Helpline Numbers

Google map showing red spots which represents the hot zones of road accident is also provided to user, which they can use to know the accident-prone zones and hence choose safer routes for driving as shown in fig VI.4.

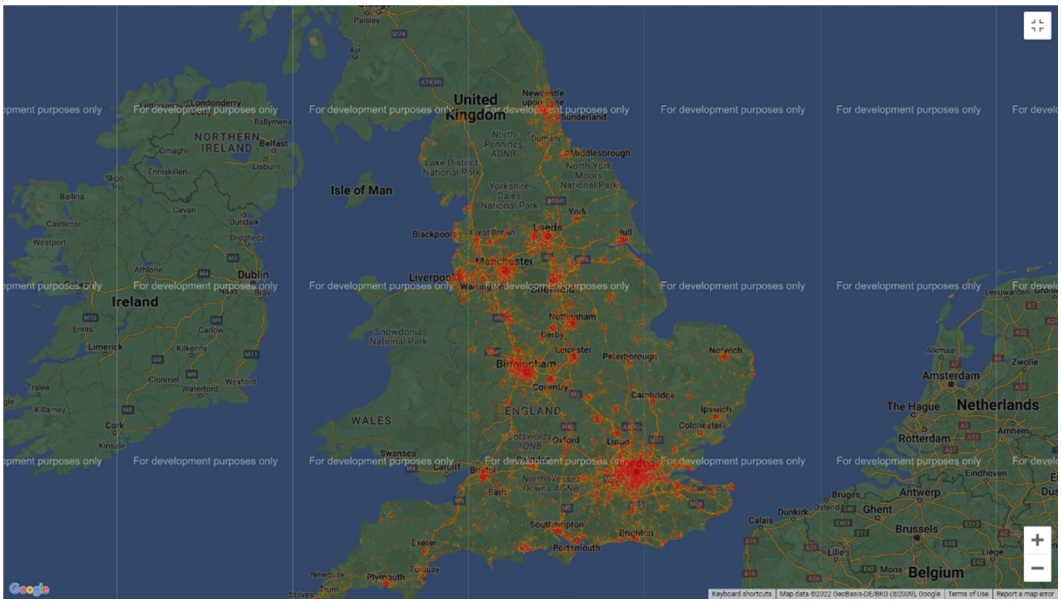

Figure VI.4: Map

VII. CONCLUSION

This project used machine learning technology to predict the severity of accident at any given location. Machine learning technology has enabled us to analyse data to predict the severity of accident with accuracy that is greater than that of humans. This project can be used in future by government or organizations to prevent road accidents or at least reduce complication due to it.

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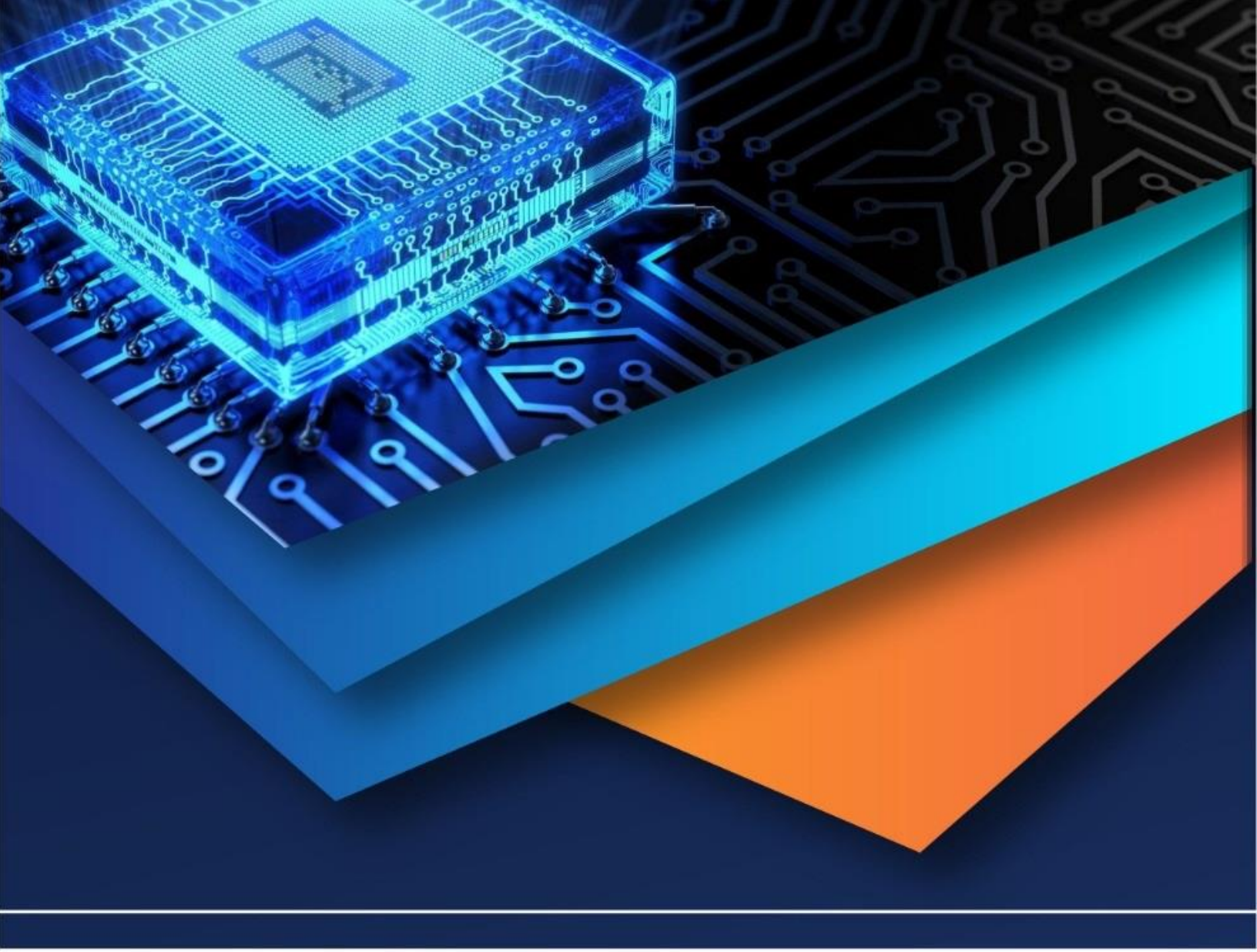

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