



Predicting and Alerting of Road Accidents

*M.Saraswathi*¹, *Pushparaj Saranya*², *E. Swetha*³

¹ Assistant Professor, Department of Computer Science & Engineering

^{2&3} B.Tech, Department of Computer Science & Engineering

Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya University,
Enathur, Kanchipuram, Tamilnadu .

ABSTRACT:

Road accident severity is a major concern of the world, particularly in underdeveloped countries. Understanding the primary and contributing factors may combat road traffic accident severity. Consequently, to handle this overwhelmed situation, a precise analysis is required. This project describes to analyse traffic accidents more deeply to determine the intensity of accidents by using machine learning. The factors such as weather conditions, lighting conditions, roadsurface etc played a role in determining the severity of the accidents. The Logistic Regression algorithm and random forest classification are applied to a set of frequencies of highway locations accidents within 24 hours to find out when and where accidents occur frequently. By using these predictions the proposed model alerts to be careful while driving in that location.

KEYWORDS: Accidents, Accuracy, Prediction, Logistic Regression, Random Forest, Road Safety .

1.INTRODUCTION

According to the dying facts launched by means of the World Health Organization, the quantity of traffic accidents happening yearly in the world is alarming. The visitors accidents killed 1.2 million people every 12 months and 50 million human beings have been injured. Approximate 3,300 humans have been killed and 137,000 humans had been injured each and every day. Road accident prediction is one of the most vital lookup location in visitors safety.

Many research have been performed to predict accident frequencies and analyze the traits of visitors accidents, along with research on hazardous location/hot spot identification, accident injury-severities analysis, and accident duration analysis. Some research focal point on mechanism of accidents. No particular method reachable for the visitors police to predict which vicinity is accident susceptible at a particular time. The site visitors accident prediction play an important position in the built-in planning and administration of traffic, the motive which with an awful lot randomness about the visitors accident consist of some nonlinear elements, such as people, car, road, climate and so on. The normal way of linear analyses can no longer disclose the in reality state of affairs considering the fact that the noise air pollution and quantity of facts are too little, purpose the end result of prediction can no longer satisfactory. Because of the regular BP community have some defects, such as nearby minimum, too many iterations, education too sluggish and so on. The common Back propagation community has defects. It has a 7.8% lower accuracy than the proposed model.

2.RELATED WORKS

A. Iranitalab, A. Khattak gave [1] "Comparison of four statistical and machine learning methods for crash severity prediction Accident Analysis & Prevention, pp. 27-36" journal with classification of Property damage only; possible injury; severe injury; disabling/fatal injury by using technique of KNN; SVM; RF in basis of local, interstate and highway areas in year 2017.

With the classifications of No injury; possible injury; non-capacitating injury; incapacitating injury; fatal injury with techniques KNN; DT; RF; SVM the researcher J. Zhang, Z. Li, Z. Pu [2], et al gave information related to Accidents Predicting in "Comparing prediction performance for crash injury severity among various machine learning and statistical methods IEEE Access," in the area of freeway in year 2018.

By using techniques of DT; RF; KNN in area of urban with classification of Damage injury; injured; hospitalized; fatal injury writer L. Wahab, H. Jiang published [3] "A comparative study on machine learning based algorithms for prediction of motorcycle crash severity PLoS One, 14 (4)" .pp. 1-17 in year 2019.

Author A.M. Amiri, A. Sadri, N. Nadimi [4], explained in "A comparison between artificial neural network and hybrid intelligent genetic algorithm in

predicting the severity of fixed object crashes among elderly drivers. Accident Analysis & Prevention, 138 “ the classification of Property damage only; complaint of pain; visible injury; severe injury; fatal injury in the basis of Highway area with the help of techniques ANN; HIGA in the year of 2020. Chang and Chen [5] created a CART (classification and regression trees) model to train and test a classifier that predicts accidents with a training and testing accuracy of 55%.

Caliendo et al. [6] used the Poisson, negative binomial, and negative multinomial regression models to predict the number of accidents on multi-lane highways.

3.EXISTING SYSTEM

No precise strategy reachable for the site visitors police to predict which region is accident inclined at a specific time. The normal Back propagation community has defects. It has a 17% decrease accuracy than the proposed model. The major drawbacks in the existing system are its accuracy and the factors that are resulting in severe road accidents. So, considering those factors that contribute to road accidents like Type of vehicle, Age of people involved in the accidents, Casualty Class, Lighting Conditions, RoadSurface and Weather Conditions the proposed model is developed .

4.PROPOSED SYSTEM

In this system by analysing earlier accident datasets and few machine learning algorithms we are going to find the accuracy and alert the person who is driving the vehicle to be careful. Taking speed of the vehicle, weather condition, location, traffic and road structure into consideration we are implementing a Prediction model to predict road accidents and alert the person in driving seat. To predict the severity of an accident under the given conditions, we are using Logistic Regression and Random Forest algorithms. By using this proposed algorithm we can find a moderate accuracy upto 86%, by preferring this accuracy an alert sound will be sent to the person who is driving.

4.1 SYSTEM ARCHITECTURE



Architecture Using Logistic Regression And Random Forest

4.2 Modules

Dataset:

A dataset in machine learning is, quite simply, a collection of data pieces that can be treated by a computer as a single unit for analytic and prediction purposes. This means that the data collected should be made uniform and understandable for a machine that doesn't see data the same way as humans do. For this, after collecting the data, it's important to preprocess it by cleaning and completing it, as well as annotate the data by adding meaningful tags readable by a computer.

Data Cleaning :

Data cleansing is frequently done in an unplanned, difficult-to-define manner. 'single structured process'. In the next steps, we'll look at data cleaning:

1. Checklist for Row Corrections and Columns Corrections
2. Checklist for Missing Values Corrections
3. Checklist for Standardizing Values Corrections
4. Checklist for Invalid Values Corrections
5. Checklist for Filter data Corrections

Algorithm :

An algorithm in machine learning is a procedure that is run on data to create a machine learning "model." Machine learning algorithms perform pattern recognition. Algorithms "learn" from data, or are "fit" on a dataset.

Evaluation :

Model evaluation aims to estimate the generalization accuracy of a model on future (unseen/out-of-sample) data. Methods for evaluating a model's

performance are divided into 2 categories: namely, holdout and Cross-validation. Both methods use a test set (i.e data not seen by the model) to evaluate model performance.

4.3 IMPLEMENTATION

There are three important steps in the implementation of proposed system:

1. Preprocessing
2. Training
3. Testing

Data Importing

We import a file to perform analysis on this data. This data is consist of a rows and columns relating various road accidents that is Accidents-sheet1.csv.

- Importing of packages needed is done.
- CSV file Accidents-sheet1.csv
- Using pandas to import data into dataframe

Data Visualization :

For predicting severity of road accidents we have considered several factors that play a crucial role in road accidents. And the graphs are plotted using those factors. They are:

- i. Age of people involved in the accidents
- ii. Casualty Class
- iii. Lighting Conditions
- iv. RoadSurface
- v. Weather Conditions

Age of people involved in the accidents :

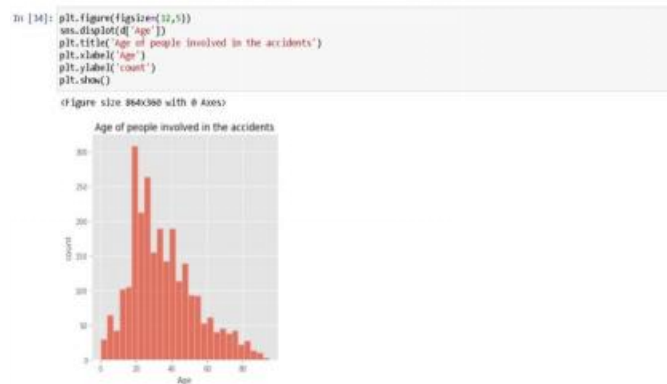


Fig2:Age of people involved in the accidents.

Casualty Class:

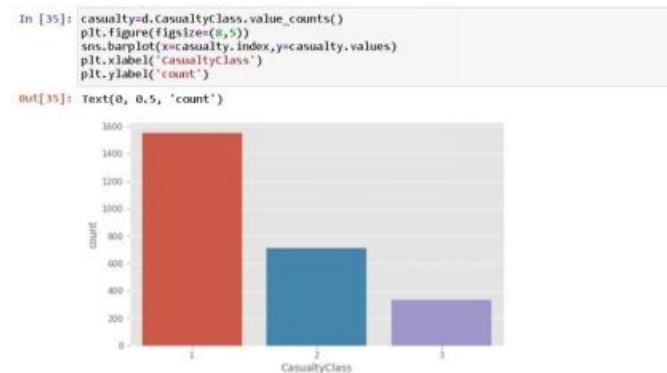


Fig 3: Casualty Class

Lighting Conditions:

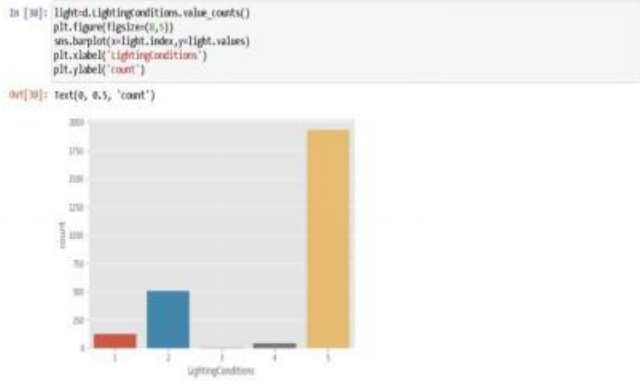


Fig4:LightingConditions

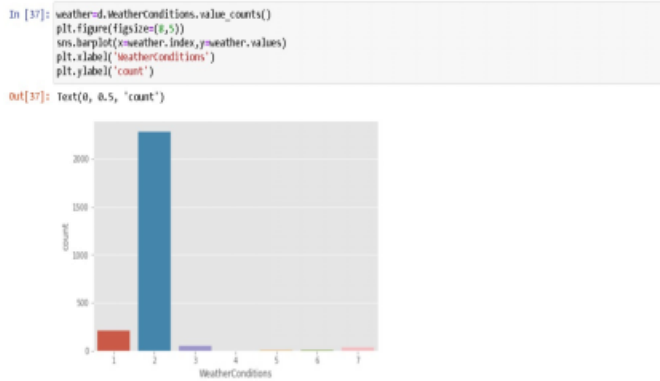
RoadSurface:

Fig5:RoadSurface

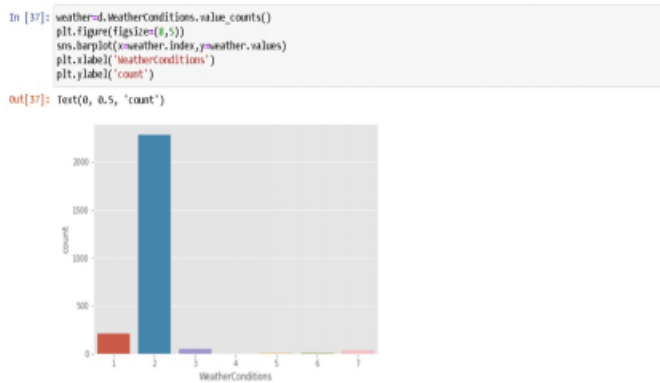
WeatherConditions:

Fig 6: Weather Conditions

Co-relation between variables :

Since our dataset is in numeric values. We can find out correlation between columns. As we see that there is not so much strong correlations between any variables. There is only one positive strong correlation between speed limit and Urban and rural areas.

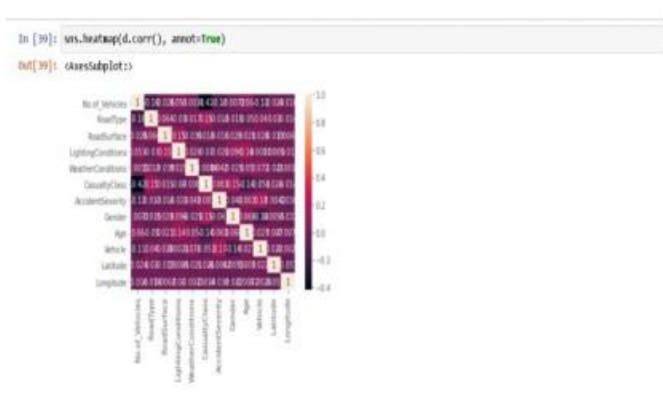


Fig 7: Co-relation between variables

5.RESULT

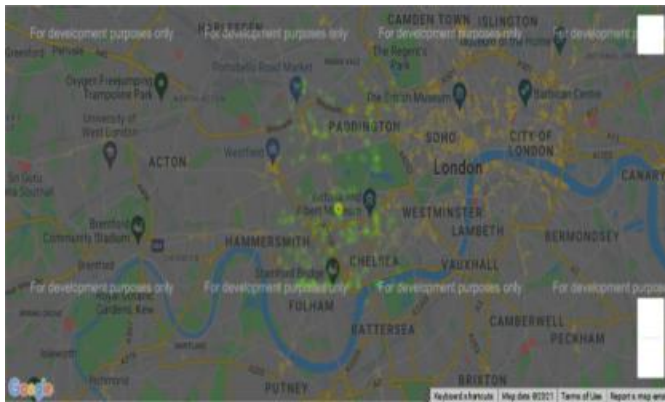


Fig 8: Result

Here the green spots shows that the corresponding areas are more prone to accidents and thus it alerts the people to drive carefully. Thus the model alerts the people and prevents road accidents.

6.CONCLUSION

Road Accidents are caused by various factors. By going through all the research papers, it can be conducted that road accident cases are hugely affected by the factors such as age of the driver, weather conditions, lighting conditions and road surface. Thus project aims at using Machine Learning classification techniques to predict severity of an accident at any particular location using all the factors. Machine Learning has enabled us to analyze meaningful data to provide solutions with a greater accuracy than with humans. We have built a model with an accuracy greater than 17% of the conventional system. A model has been created using the most accurate algorithm has been developed. This project can be used by governments to prevent accidents. Thus we have built an application which gives efficient prediction of road accidents using machine learning.

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