Analysis of Road Accidents With Impact of Weather Conditions Using Machine Learning

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Abstract- *According to Statistics many people have been died and millions injured in road accidents all over the world. Hence the factors responsible for this accident need to be analyzed. This paper proposes a model which utilizes an efficient machine learning algorithm for data analysis and prediction. The road accident data analysis use data mining and machine learning techniques, focusing on identifying factors that affect the severity of an accident. There are a variety of reasons that contribute to accidents. Some of them are internal to the driver but many are external. For example, adverse weather conditions like fog, rainfall or snowfall cause partial visibility and it may become difficult as well as risky to drive on such roads. It is expected that the findings from this paper would help civic authorities to take proactive actions on likely crash prone weather and traffic conditions.*

Keywords- Data analysis, Machine learning, data, accident, vehicle, regression analysis, python

I. INTRODUCTION

Accident prediction is an important safety issue to raise alarms before accident happens. The road accident data analysis use data mining to examine recorded road attributes to reduce road accidents using machine learning techniques. There are variety of reasons that contribute to accidents. Some of them are internal to drive but many accident occur due to various external factors. to the driver but many accidents occur due to various external factors. For example, adverse weather conditions like fog, rainfall or snowfall cause partial visibility and it may become difficult and risky to drive on such roads. The data mining techniques are used to analyze the data provided by EMRI (Emergency Management research Institute).In the existing system as most of the studies did not pay enough attention on the ability of the drivers as a factor or cause for any kind of accidents, analysis on the prediction of accidents with respect to fault on vehicles and drivers condition are only considered. Hence in the proposed system, efficient Machine Learning algorithm has been developed to predict and analyze the cause of accidents due to various weather conditions like fog, rainfall, snowfall. Thus the proposed algorithm will act as middleware which uses the techniques that involved data slicing, data analysis and data pre processing for secured and optimized results. Mobile app is developed which gives information about weather conditions on the road instantaneously to the drivers and respective security people, which helps the driver and the public servants to ensure road safety and to avoid accidents.

Section II: To describe the Objective of the project, Section III: Literature survey of the project, Section IV: Methodology of the project,Section V: Advantages of the project.,Section VI: Verification and Results, Section VII: Conclusion and Future Scope and Section VIII: References.

II. OBJECTIVE

The main objective is to design a middleware which uses machine learning algorithm that involves collections of data, data processing, data analysis and to obtain secure and optimized results, related to occurrence of road accidents with respect to various weather conditions like rainfall, snowfall, fog. The data is collected from the related repository and the collected data is analyzed using the tool Anaconda.. NumPy („Numerical Python' or „Numeric python') is open source module which provides fast computation on arrays and matrices. NumPy is the fundamental package for scientific computing with Python.

III. LITERATURE SURVEY

Benedikt Graler,Imke Ines Klatt,Martin Pontius and Albert Remke designed a Predictive Analytics to Improve Road safety.In this paper analysis of this heterogeneous combined data set comprises simple statistical tools, plots like histograms, scatter plots, heat maps, and also recent data mining and machine learning developments such as random forest The leading aspect in the study is the hypothesis that an increased occupancy of roads which increases the probability of car accidents. Of certain interest is the scenario of large traffic jams on the surrounding motorways when a considerable number of drivers tries to bypass these jams by driving through the city leading to a considerably increased volume of cars traversing the city.

G. Mani Kandan, Sarilya Jaiswal, Rahul Mishra and Mrs. Steffina Muthukumar designed a Analysis and Prediction of Road Accidents By Graphical Visualization using Machine Learning In this paper middleware is used for data slicing and data analysis.Data pre-processing is an important and mandatory step for any machine learning model because it involves steps like feature scaling to get exact values. The model is trained with three algorithms one by one using the important features and at last accuracy is compared for the three algorithms based on true and predicted results.

S. Nagendra Babu and J. Jebamalar Tamilselvi designed a A data framework to analyze road accident data using map reduce CCMF and TCAMP Algorithm In this paper examination like sort of vehicles(bike, auto, transport, lorry, jeep) is done present rate dissemination of accident on different criteria, speed seriousness. Comparable investigation is done on other criteria, for example, conveyance of accidence by time of accident and expired age, dispersion of accident by month and climate amid the mishap, dissemination of accidents by softness and speed confine, circulation of accidents by data of mischance and perished age, circulation of accidents by expired feelings.

Miao Chong, Ajith Abraham and Marci Paprzycki designed a Traffic Accident Analysis Using Machine Learning Paradigms In this paper performance of neural network, decision tree, support vector machines and a hybrid decision tree – neural network based approaches to predicting drivers‟ injury severity in head_x0002_on front impact point collisions. The classification accuracy obtained in our experiments reveals that, for the non-incapacitating injury, the incapacitating injury, and the fatal injury classes, the hybrid approach performed better than neural network, decision trees and support vector machines.

Md. Farhan Labib, Ahmed Sady Rifat, Md. Mosabbir Hossain, Amit Kumar Das, Faria Nawrine designed a Road Accident Analysis and Prediction of Accident Severity by Using Machine Learning In this paper losses in road accidents are unbearable, to the society as well as a developing country like us. So, it has become an essential requirement to control and arrange traffic with an Advanced system to decrease the number of road accidents in our country. By taking simple precautions, based on prediction or warnings of a sophisticated system may prevent traffic accidents.

IV. METHODOLOGY

The proposed system is designed using the architecture clustering is an unsupervised data mining techniques whose main task is to group the collected data objects into different cluster such that objects within a group are more similar than the objects in other clusters. Data preprocessing is a data mining technique which is used to transform the raw data in useful and efficient format. Trend analysis is a technique used in technical analysis that the attempts to predict the future stock price movements based on recently observed trend data. Trend analysis is based on the idea that what has happened in the past gives traders an idea of what will happen in the future.

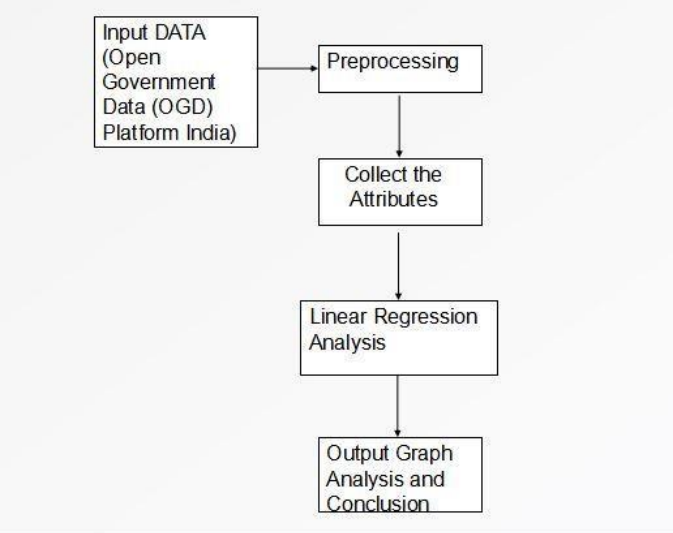

Fig no:1.1 Block Diagram of System

BLOCK DIAGRAM DESCRIPTION:

INPUT DATA (OGD): The Input data is a Open Government Data platform India Open Government Data: Data produced or commissioned by government or government controller entities. Data which is open as define in the Open as defined in the open definition, that is it can be freely used, reused and redistributed by anyone.

PRE-PROCESSING: Data preprocessing is an important step in the data mining process. Data preprocessing is a process of preparing the raw data and making it suitable for a machine learning model. It is the first and crucial step while creating a machine

COLLECT THE ATTRIBUTES: Attribute/Feature: An attribute is an aspect of an instance (e.g. temperature, humidity). Attributes are often called features in Machine Learning. Training/Learning: A classifier learns the classification rules based upon a given set of instances (training data).

LINEAR REGRESSION ANALYSIS: Linear regression performs the task to predict a dependent variable value(y) based on a given independent variable (x). So, this regression

technique finds out a linear relationship between x (input) and y(output). Hence, the name is Linear Regression. Y=mx+c

OUTPUT GRAPH ANALYSIS AND CONCLUSION: Graph analytic is another commonly used term, and it refers specifically to the process of analyzing data in a graph format using data points as nodes and relationships as edges.

V. ADVANTAGES

- The main result for this study is that although the characteristics of humanity and behavior are very important in occurrence of all road accidents. But we can understand that spatial features and infrastructure play a major role in the accident.
- To use Regression Algorithm to analysis the data
- In this study, it is tried to choose various number of attributes to provide a lot of valuable information for the government to provide better safety policies.

VI. VERIFICATION AND RESULTS:

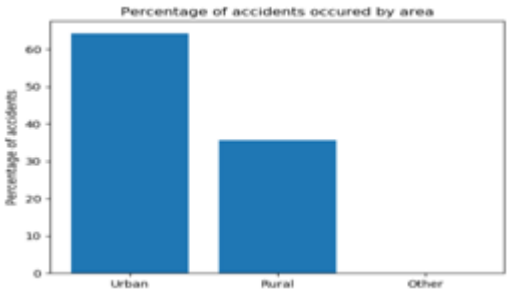

FIG NO:1.2 Histography of Percentage of accidents occur by area

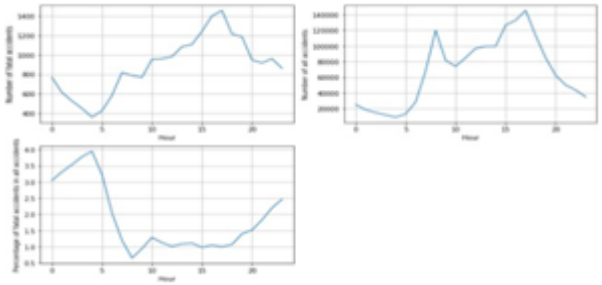

FIG NO:1.3 Percentage of total Accident Vs Hour

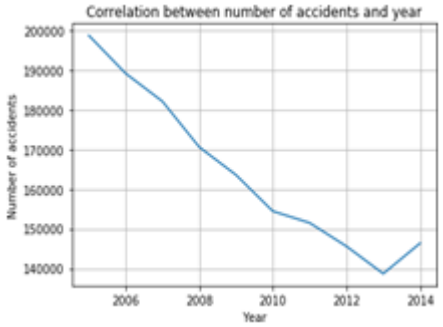

FIG NO:1.4 Correlation between no. of accident and year

VII. CONCLUSION AND FUTURE SCOPE

In this paper we have proposed a model which will help the data scientist that how a data can be analyzed and then extracting the important features that will actually help in any model as of data pre-processing is the mandatory step for each and every machine learning model. Thus the prototype will be successfully designed and a user friendly Mobile App is developed that offers great benefits to drivers and public servants to monitor the road safety for various weather conditions. Future work may be after studying these models, anyone can relate the problems definition that, what are the features that are actually causing a problem (here accident)and based on that precautionary measures can be taken to avoid accidents. Hence this project can be extended to create a user friendly Android app to indicate where accident can occur and to increase the safety.

REFERENCES

[1] Chong M., Abraham A., Paprzycki M., "Traffic Accident Data Mining Using Machine Learning Paradigms" 2004 International Conference on Intelligent Systems Design and Applications (ISDA'04), Hungary, ISBN 9637154302,

[2] Miao Chong, Ajith Abraham and Marci Paprzycki,"Traffic Accident Analysis Using Machine Learning Paradigms",Computer Science Department, Oklahoma State University, USA in 2004.

[3] Nejdet Dogru, Abdulhamit Subasi, "Traffic Accident Detection By Using Machine Learning Methods", 2010 International Burch University, Sarajevo, Bosnia and Hezegovina.

[4] Sahil Dabhade, Sai Mahale, Avinash Chitalkar ,"Road Accident Analysis and Prediction using chine Learning" 2012 Information Technology, Sanjivani college of Engineering Kopargaon.

[5] Nagendra Babu and J. Jebamalar Tamilselvi, " A data framework to analyze road accident data using map reduce CCMF and TCAMP Algorithm",IJSST 2015 Jaya Engineering, Thiruniravur, Chennai, India.

[6] Sachin Kumar, DurgaToshniwal, "A data mining approach tocharacterize road accident locations", J. Mod Transport.(2016)24(1):62– 72.

[7] Mani Kandan G, Sarilya Jaiswal, Rahul Mishra and Mrs. Steffina Muthukumar,"Analysis and Prediction of Road Accidents By Graphical Visualization using Machine Learning", IJRAR- March 2019 International Journal of Research and Analytical Reviews

[8] Md. Farhan Labib, Ahmed Sady Rifat, Md. Mosabbir Hossain, Amit Kumar Das, Faria Nawrine,"Road Accident Analysis and Prediction of Accident Severity by Using Machine Learning" 2019 International conference on smart Computing & Communications (ICSCC).

[9] Vipul Rana, Hemant Joshi, Deepak Parma, Pradnay Jadhav, Monika Kanojiya,"Road Accident Prediction using Machine Learning Algorithm", 2019 Computer Engineering Department, Shah Anchor Kutchhi Engineering College, Mumbai.

[10] Benedikt Graler, Imke Ines Klatt, Martin Pontius and Albert Remke,"Predictive Analytics to Improve RoadSafety",IEEE Xplore November 2020 California Institute of Technology.