Traffic Accident Analysis: Comparing Periods Before And After The Covid 19 Outbreak

L.Madhu Bala[1], C.Kavitha[2]
[1]Dept of Computer Science
[2]Assistant Professor, Dept of Computer Science
[1, 2] Sri Kaliswari College (Autonomous) Sivakasi

Abstract- *Extracting knowledge from open records of traffic accidents has been attracting growing interest to policymakers answerable for road safety. This article presents a information elicitation technique to exploring the determinants of traffic accidents from open authorities records of an US . The accumulated open dataset consists of 44 decisional attributes and 17,874 instances. Prediction models using a class-oriented mechanism and generated guidelines that considered datasets from before (B-dataset, 9,973 instances) and after (A-dataser; 7,901 cases) starting to fight the Covid-19 pandemic in an US had been in comparison. The findings showed at 98.90% for A-dataset and 71.24% for B- dataset. The research demonstrates the value of open authorities facts in prediction model development and information elicitation in help policymaking inside the traffic safety domain.*

Keywords- Traffic Accident, ANN Algorithm, US Accident, Machine Learning ,Prediction.

I. INTRODUCTION

As road traffic injuries are many of the leading participants of in- juries and fatalities, the improvement of traffic accident evaluation and prediction fashions is an important area of research (Chand et al., 2021; Sangkharat et al., 2021; Tavakoli and Heydarian, 2022). All site visitors accidents have a value, and this cost may even be immeasurable when human injuries and fatalities are concerned (French et al., 2009; Kaygisiz et al., 2017). the entire cost of traffic injuries is often expressed as a certain percentage of a country's gross home product (Elvik, 2000; Connelly and Supangan, 2006; law et al., 2009), showing the glaringly terrible effect of injuries on country wide economies (Vipin and Rahul, 2021). Exploring the important thing elements in the back of traffic accidents that lead to accidents and fatalities is one of the primary targets of studies in search of to broaden insights to support traffic safety policymaking. There are a variety of reasons for the severe trouble of a high quantity of visitors injuries, and a few viable solutions with respect to policies and strategies, including helmet and drink-using legal guidelines, had been proposed and carried out (Vorel et al., 2014; George et al., 2017; Alcaniz et al., 2021). Prediction models that can be used to reveal causes of site visitors accidents in historic information are proposed with the aid of researchers to resource in developing such techniques to lessen visitors accidents (Li and Zhao, 2022; Roy et al., 2021; Valent, 2022; Sangkharat et al., 2021; Olowosegun et al., 2022; Antona-Makoshi et al., 2018). moreover, since 2019, the Covid 19 pandemic has had a good sized impact on behavior in using transportation systems and has thereby inspired avenue visitors injuries (Chen and Pan, 2020; Valent, 2022; Li and Zhao, 2022). as an example, the excessive chance belief of Covid-19 infection produced greater self limit behaviors (eg, finding out not to travel, avoiding crowds), specifically on the subject of eating out and leisure sports (Parady et al., 2020). To lessen the probability of contamination, workers or tourists started out to prefer private automobiles over public transportation systems. it's miles expected that five.three% of commuters shifted from public to non-public delivery modes because of the Covid-19 pandemic (Pawar et al., 2020). these adjustments are probably to have an influence on traffic accidents, and this desires to be investigated to evolve applicable safety regulations.

II. LITERATURE REVIEW

2.1. Prediction of traffic accidents:

The literature identifies the growing importance of traffic injuries as the main motive of accidents and fatalities (Olowosegun et al., 2022; Roy et al., 2021; Valent, 2022; Ratanavaraha and Suangka, 2014; Xin et al., 2020). various determinants were considered and tested in as- sociation with traffic injuries and fashions had been developed to give an explanation for those determinants. The remaining aim of this frame of studies is to apprehend and reduce the probability of site visitors injuries and to offer suggestions to aid street protection policymaking. The relevant literature is summarized on this section.

The factors are normally divided into up to four foremost working categories: human, car, environment, and criminal and socioeconomic. while the early research often considered or three categories, more current studies have

tended to attention on a unmarried category. for example, some research considered human, car, and surroundings elements collectively for their contribution to site visitors injuries or avenue safety risks (de Ona et al., 2014; Kwon et al., 2015; Altwaijri et al., 2012). other research have analyzed handiest the environmental elements in road injuries (Ali et al., 2021; Kaygisiz et al., 2017; van Wee et al., 2019; Charlton et al., 2018). furthermore, one observe considered criminal and socioeconomic factors from a governmental perspective (Vorel et al., 2014), one pro- posed a social community-based totally version to hit upon site visitors injuries and road glide (Ali et al., 2021), two analyzed traffic coincidence mortality based totally on temporal factors (Vipy & Rahul, 20213 Park et al., 2021), and one seemed into motorcyclist injuries the usage of a spatiotemporal evaluation.

2.2. Effects of the Covid-19 pandemic on traffic conditions

The Covid-19 pandemic has fundamentally influenced the lifestyles and travel behavior of individuals across communities in numerous ways, along with faraway working, social distancing, self-isolation, consuming at domestic, and modifications to enjoyment sports (Pawar et al., 2020; Hotle et al., 2020). these adjustments can also have unpredictable results for visitors acci- dents. studies which have explored the general effects of the Covid-19 pandemic are contributing to the adaptation to the effect of the dis- ease, the development of which stays unpredictable. for example, the factors that result in behavioral changes were tested in an online panel survey that specialize in chance perception and social influence (Parady et al., 2020). the principle locating recommended that targeting the avoidance of non-important tour is probably powerful in addressing the severity of Covid-19, specially amongst corporations that have problem keeping social distancing. based on protection motivation concept, the effect of risk perception on tour to diverse places has also been examined (Hotle et al., 2020). It turned into determined that people would reduce the quantity of journeys they took in the event that they perceived medium or high ranges of threat, however this changed into no longer the case for travel to workplaces, even when the perceived dangers have been high.

A take a look at of the effect of Covid-19-associated lockdowns on visitors acci- dents from March sixteen to April 26, 2020 estimated that the number of accidents in step with day decreased with the aid of 74.three% in assessment with the previous week and through 76% with the previous 12 months (Saladié et al., 2020) because of the

2.3.Classification-based technique

Classification-oriented knowledge elicitation techniques have been successfully applied in various domains (Quinlan, 1986; Lausch et al., 2015; Wu and Kao, 2021), and have the advantageous features of an entirely data-driven approach, learnability, high classification accuracy, and multi-context datasets, particularly when the data is characterized by multi-dimensionality, multi-collinearity, and non-homogeneity. Although it is not a new model, variants of the classification tree algo- rithm, such as ID3, C4.5, CHAID, CART (Ture et al., 2009), random forest (RF; Breiman, 2001), and their extensions (Rao et al., 2019), have demonstrated high applicability.

A decision tree is a promising mechanism when considering a classification-based prediction model (Rao et al., 2019; Wu and Kao, 2021). By using the ANN algorithm consider the pruning and non- pruning ability by computing the gain ratio of an attribute.

III. METHODOLOGY

3.1.ANN ALGORITHM

The term "Artificial neural network" refers to a biologically inspired sub-field of artificial intelligence modeled after the brain. An Artificial neural network is usually a computational network based on biological neural networks that construct the structure of the human brain. Similar to a human brain has neurons interconnected to each other, artificial neural networks also have neurons that are linked to each other in various layers of the networks. These neurons are known as nodes.Artificial neural network tutorial covers all the aspects related to the artificial neural network. In this tutorial, we will discuss ANNs, Adaptive resonance theory, Kohonen self-organizing map, Building blocks, unsupervised learning, Genetic algorithm, etc.

3.2 Dataset Used

An accident Dataset , known as US accident ,which is taken from the Kaggle, is used to assess the proposed methodology. The sample was divided into two parts, one with 80% of the data for training and 20% of the data for testing. Python and Jupyter notebook are used to execute the suggested mechanism. It is a computer language that is open-source. Python offers quick programme implementation. It may offer built-in library files for users' programmes to execute. Python is the language of choice for data processing software.

3.3 Preprocessing

Label Encoding refers to converting the labels into a numeric form so as to convert them into the machine-readable form. Machine learning algorithms can then decide in a better way how those labels must be operated. It is an important pre-processing step for the structured dataset in supervised learning.

IV. RESULT

Accuracy

Accuracy is used in classification problems to tell the percentage of correct predictions made by a model. Accuracy score in machine learning is an evaluation metric that measures the number of correct predictions made by a model in relation to the total number of predictions made. Calculate it by dividing the number of correct predictions by the total number of predictions.

Accuracy=Number of Correct Prediction/ Total Number of Prediction

Table 1

ANN	Accuracy
Dataset-A	98.90%
Dataset-B	71.24%

V. CONCLUSION

This study used the classification-oriented technique on open government data in US to model traffic accidents. In this paper, the literature on the use of open data is reviewed and the procedure is re- ported for pre-processing the collected dataset, splitting the dataset into two subsets for comparison, applying the classification-oriented technique to predict traffic accidents, and generating decision rules to achieve the research objectives. Four categories of variables were considered as potential determinants of traffic accidents temporal, environmental, human, and vehicle. With various combinations of categories having been used in the literature, the findings of the present study disclose that human and vehicle factors are more important than the other two. Although it is worth placing emphasis on how to develop a safe traffic environment, vehicle drivers or users are key to the reduction of traffic risks.

5.1 Future Work

Some limitations of the study are worth mentioning with a view to supporting further research . Further insight could be provided by analyzing additional data source, such as technologica surveillance system.This prediction model can be extended to developing prediction models for others traffic isues..

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