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PREDICTING RELATIONSHIP BETWEEN TRAFFIC ACCIDENTS WITH RELATED INJURIES

Hemanth RN[*1], Smt. Gouri S Kulkarni[*2]
[*1]PG Student, The National Institute Of Engineering, Mysore, Karnataka, India.
[*2]Assistant Professor, The National Institute Of Engineering, Mysore, Karnataka, India.

ABSTRACT
Traffic accidents are among the most critical issues facing the world as they cause many deaths, injuries, and fatalities as well as economic losses every year. Accurate models to predict the traffic accident severity is a critical task for transportation systems. This investigation effort establishes models to select a set of influential factors and to build up a model for classifying the severity of injuries. These models are formulated by various machine learning techniques. Supervised machine learning algorithms and unsupervised machine learning algorithms are implemented on traffic accident data. The major objective is to discover the correlation between different types of the traffic accidents with the type of the injuries. The findings of this study indicate that the unsupervised learning techniques can be a promising tool for predicting the injury severity of traffic accidents.
Keywords: Traffic Accidents, Injuries, Machine Learning, Accuracy.

I. INTRODUCTION
Roadway traffic accidents regularly cause fatalities, serious injuries, and property damage, resulting in enormous losses on both an economic and social level. The World Health Organization (WHO) estimates that over 1.5 million diverse road users died in traffic accidents in 2017, with half of those deaths being related to collisions. In addition, it is anticipated that by 2030, traffic accidents will surpass all other causes of death in the absence of sustainable traffic.

The number of vehicles on the road and traffic congestion rise along with the demand for vehicles, especially during peak hours. As a result, one of the major global causes of death and injury is traffic accidents. The Michigan Traffic Crash Decade-At-A-Glance report estimates that there were over 314,921 traffic accidents in the US in 2017, with a yearly cost to the nation of over $230 billion. Over 78,394 people were hurt, while over 1,028 individuals lost their lives. In order to create classifiers that can forecast accidents, classification methods are among the most widely employed techniques in mining traffic incidents. These classifiers are developed using training sets of data that contain information on the causes of accidents.

Making wise decisions that eliminate preventable incidents on motorways therefore requires the use of investigative and predictive techniques like machine learning algorithms. Can algorithms for machine learning help save lives? This motivates the authors of this work to utilize machine learning algorithms to forecast and examine motorway crashes based on the conditions of the road, the drivers involved, and the surrounding environment. The main goal of this study is to accurately determine the characteristics that contribute to traffic accident severity in order to decrease accident frequency and severity in the near future, perhaps saving many lives and a significant amount of money, among other things. The study also sought to develop models for choosing a group of influential characteristics and for grading the severity of injuries that may be used by the Michigan Traffic Agencies (MTA). The MTA and other responsible organizations in Michigan will benefit from using this strategy to assist them be moreproactive in addressing high-risk zones on roadways.

II. LITERATURE REVIEW
One of the main goals of accident data analysis is to identify the primary causes of traffic accidents. The Paper [1] analyses the variability of the data on traffic accidents makes analysis difficult. Data partitioning is used to combat data heterogeneity. The primary objective of segmenting the data on road accidents in the proposed method involves the k-means clustering method. Additionally, association rule mining is used to find instances of the entire data set and instances of clusters identified by the k-means clustering technique. Major information is produced by the combined result of k-means clustering and association rule.

This study [2] attempts to consider the gathering and analysis of accident data as a system that needs a unique perspective to comprehend the entire and make sense of it for better decision-making in an effort to address the issue of road safety. The goal of this machine learning experimental research is to investigate and forecast the

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role of road users on potential injury hazards. This research falls under the umbrella of information architecture research for road safety in developing nations. Classification and Adaptive Regression Trees (CART) and Random Forest techniques were used in the study. Road accident data gathered from Addis Ababa Traffic Office is subjected to many-sided analysis in order to find pertinent patterns and demonstrate the effectiveness of the methodologies for the domain of road safety. Experimental findings indicated that the models could categorize accidents with a high degree of accuracy.

Paper [3] tells us that, road accidents are now the ninth most common cause of mortality worldwide, and they have emerged as a global issue. In Bangladesh, there are a lot of road accidents each year, which has become a big problem. Allowing its citizens to be killed in traffic accidents is completely unacceptable and saddening. As a result, a thorough investigation is needed to manage this chaotic situation. This study was conducted in Bangladesh to examine traffic incidents in greater detail and gauge their severity using machine learning techniques. We also identify the key elements that clearly influence traffic accidents and offer some helpful recommendations on this subject. Four supervised learning techniques—Decision Tree, K-Nearest Neighbors (KNN), Naive Bayes, and AdaBoost—have been used in the analysis to classify the severity of accidents into four groups: fatal, grievous, simple injury, and motor collision. AdaBoost, in the end, produces the best results.

III. PROPOSED SYSTEM

The proposed solution is a real-time application that helps the government sector assess the severity of injuries and decrease the frequency of traffic accidents. As a significant aspect of our daily lives, traffic safety must be continually improved using all possibilities and resources that are available. A fascinating alternative with potentially beneficial effects for all interested parties is produced by descriptive or predictive mining techniques used to historical data regarding accidents that have occurred in conjunction with other crucial information like weather or traffic conditions.

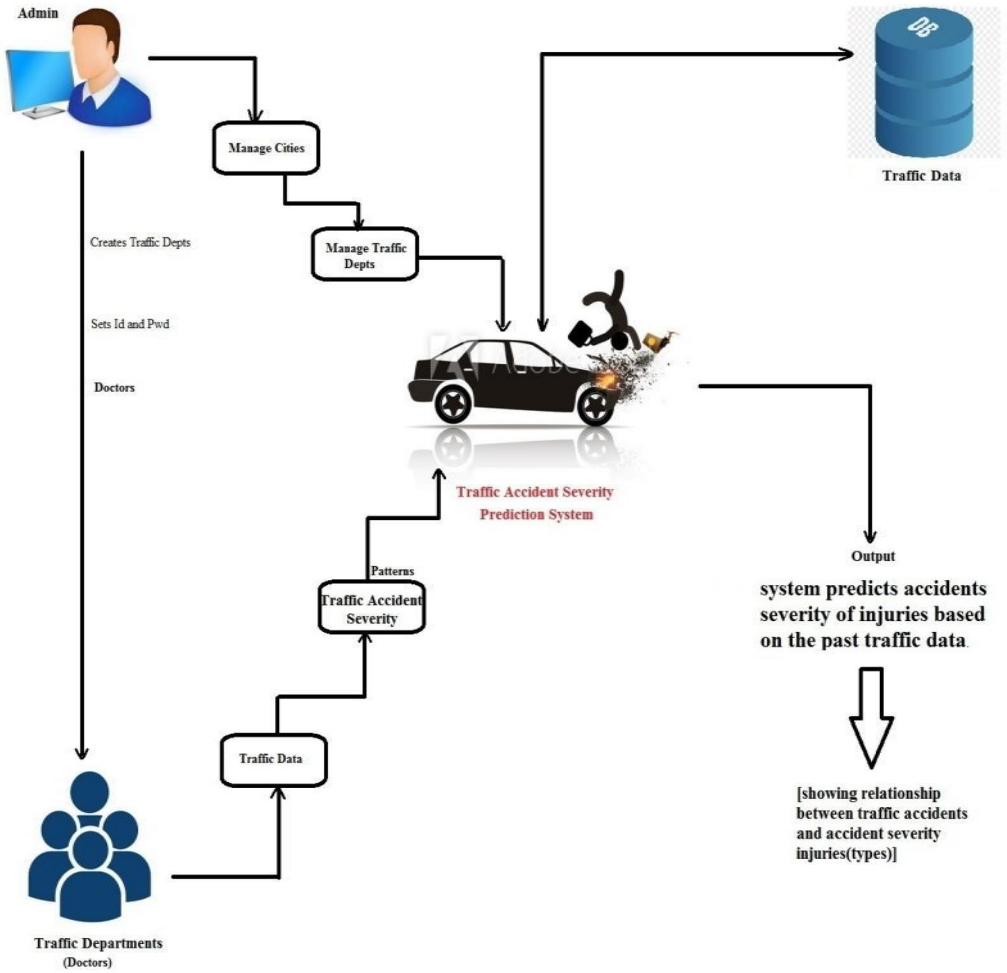

Fig 1: Proposed System Architecture

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IV. IMPLEMENTATION

The implementation of system includes different steps that explains how the operations are performed in the project.

4.1 Data Collection

We are working on real time application, we build a new application which contains data servers (used to store data). Data collection means collecting data from different sources. Data includes Year, Speed Limit, Weather-condition, School-zone, Humps, hospital zone, road type, men at work, Accidents and Injuries.

4.2 Data Preparation

Here data from servers extracted and analyzed. Complete data extracted and analyzed where we remove irrelevant data and retain data required for processing. According to the project only accidents and injuries are required to generate outputs.

4.3 Specify Constraints

Support count

The relationship between the total number of transactions containing that item (A) with the total number of transactions in data set.

Confidence

Confidence of item set defined as total number of transactions containing the item set to the total number of transactions containing LHS.

4.4 Association Rules Mining (Eclat Algorithm)

Association (or relation) is probably the better known and most familiar and straightforward data mining technique. Here, we make a simple correlation between two or more items, often of the same type to identify patterns.

Eclat algorithm is selected because of the following reasons.

- Quicker Results (takes less time for Prediction)
- Works fine for small data set as well as Huge data set.
- One scan of Database is Enough.
- Works fine for multiple constraints.

4.5 Patterns Prediction

Here system predicts the relationship between frequent traffic accidents with injury types.

Machine learning is a process of studying a system based on data. Machine learning is a part of data science where we use machine learning algorithms to process data.

V. RESULT AND DISCUSSION

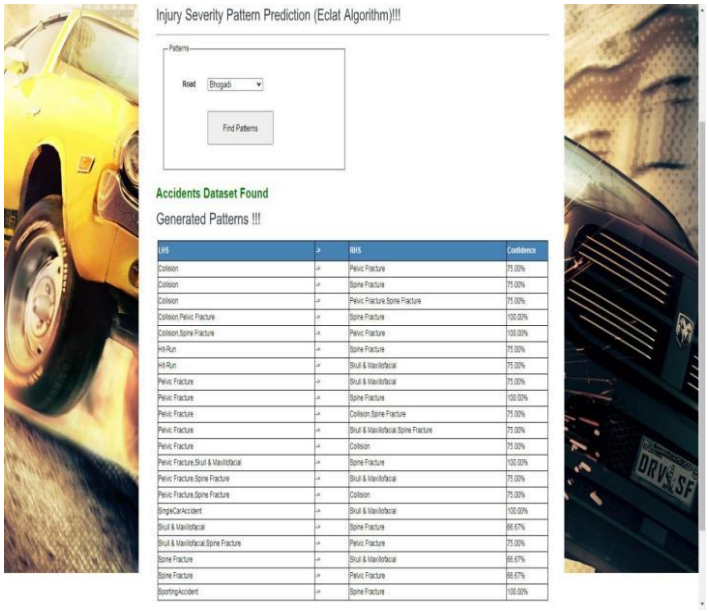

Fig 2: Patterns generated (showing relationship b/w accidents and injury types)

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- SingleCarAccident -> Skull & Maxillofacial
- Sporting Accident -> Spine Fracture
- Drunk Drive -> Back and Spinal Cord Trauma
- Hit-Run -> Broken Bones, Brain Injuries
- Hit-Run -> Brain Injuries

VI. CONCLUSION

As a significant aspect of our daily lives, road safety must be continually improved using all chances and resources at our disposal. Incorporating weather or road conditions with descriptive or predictive mining techniques applied to historical data regarding accidents results in an intriguing alternative that could have positive outcomes for all parties involved. These factors drove the development of this work, which examined data samples about UK road accidents that represented a sizable volume of data and necessitated the deployment of an in-memory data processing technique that was comparatively new in this field.

VII. FUTURE ENHANCEMENTS

We can include public notifications that benefit the public. We can build a query module to allow for member and administrator communication. We can anticipate accident causes, which enables traffic agencies to take preventative action.

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