Traffic Management System using Big Data Analytic Tool

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Abstract- Traffic congestion have become a serious issue nowadays especially in metro cities. Increase in population, rise in income which leads in more number of vehicles on the roads, insufficient space in the road to handle traffic etc are the different causes of traffic congestion. The analysis of huge data of transportation and accidents has many potentials and it can give very useful insights from the hidden relationship of data. This paper uses classification algorithms using data mining techniques to predict the possibilities of accident occurs which uses python packages and also a use of big data in traffic management system.

Keywords: **Big Data, Data mining Techniques, Python.**

INTRODUCTION

It is predicted that, in few decades most of the world population will live in the urban regions. This may lead to many socio-economic challenges. In recent years the cities world over have grown by leaps and bounds Traffic safety is one of the main priorities of any governments. Traffic management stands as important issue to be considered for better transportation. One of the major problems faced by cities today is traffic congestion. Traffic jams causes a rise in the cost of transportation as well as it affects the routine lives of people. The problem of traffic congestion pervades everywhere, The ever increasing nature of traffic makes it difficult to estimate the road traffic density in real time so as to make better traffic related decisions and manage the traffic more efficiently.

There are several reasons for this sudden surge in the traffic, in urban regions. The main reason can be attributed to rise in the population which in turn has caused rise in the number of vehicles on the road. Apart from this, congestion also occurs due to for congestion like insufficient capacity of roads, large red light delays; incomplete information regarding traffic, inefficient transport management. WEKA tool helps us to compare data mining techniques such as Classification, Regression etc. on real data.

In this paper we propose a dynamic traffic management system using video monitoring and traffic surveillance techniques. The proposed system uses CCTV cameras installed on traffic checkpoints as an input method to capture videos and converts them into image frames. Further image processing is performed on these image frames and total number of vehicles is calculated in each frame which is then added to get the total number of vehicles in every lane. Accordingly the traffic cycle for each lane will be increased or decreased based on the traffic density value.

BACKGROUND

Weka Tools

WEKA is an incredible asset as it contains both regulated and unsupervised learning procedures. WEKA is an effective methodology and beats other information mining approaches . We use WEKA since it encourages us to assess and look at information mining systems (like Classification, Regression and so on.) advantageously on genuine information. it works and contains a gathering of representation devices and calculations for example: Naïve Bayes, Decision tree, classifier for taking care of genuine information mining issues and aides in rush hour gridlock expectation.

Random forest algorithm:

Gathering learning strategy for order, relapse and different errands, that work by developing the large number of choice trees at preparing time. This calculation constructs a randomized decision tree in every emphasis of the calculation and produces amazing indicators. Each sub tree gives a characterization and gives the tree votes to that class

Naïve Bayes algorithm:

Naive Bayes classifiers are a group of straightforward probabilistic classifiers, utilized for content arrangement. Naïve Bayes classifier is one of the productive and profoundly adaptable inductive learning calculation which is prepared in an administered learning system. It accept every one of the properties are restrictively free for assessing class conditional probability.

Pandas

It aims to be the fundamental high level building block for doing practical, real world data analysis in python

Scipy

It depends on Numpy, which provides convenient and fast N-dimensional array manipulation

Matplotlib

It is a plotting library which produces publication quality figures in a variety of hardcopy formats and interactive environment.

RESULT AND DISCUSSION

A. Accident analysis

From the analysis of the accident's data and by discovering the hidden relationships, we can extract the main causes of accidents that lead mainly to traffic congestions. The prediction results are given as:

- 64.92% of all accident happen on residential areas where the speed limit is 30kmh.And the accidents don't happen on highways as most people think.
- 65.8% of accidents occur in urban area, which says most of the accidents occur in urban areas not in rural areas.
- 50% of accidents occur in uncontrolled junction or give way junction.

- Analysis shows that 81% accidents occurs when the weather is fine but not in bad weather, especially when there is a snow or fog.
- And 73.8% of accidents occurs during daylight
- Most of the accidents occur during weekend(Friday)as shown in figure1

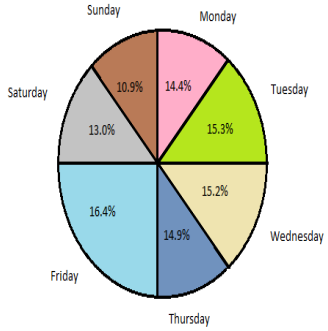

Figure 1: Accident data analysis

B. Vehicular causality data analysis

In this work, we are concerned with mining drivers data, since human actions motivated by achieving various purposes, cause side effects on the environment, whether they are intentional or not. By studying the human behavior and impact, e can design new rules to the drivers and the passenger depending on their age, sex, type of passenger and many more individual or combined characteristics. And this analysis can be shown in the figure below

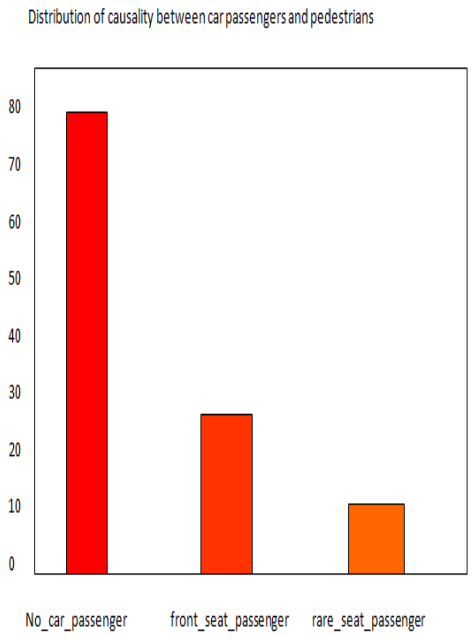

Figure 2: vehicular causality data analysis

SYSTEM DESIGN

The general system design is as shown in figure 3. First of all the videos are captured from the CCTV cameras installed at traffic junctions. From every intersection the videos are captured and stored in the database of the traffic department. The system first acquires the traffic video data i.e. live traffic feed from the traffic department database. The videos are converted to image frames for further processing. These image frames are given as an input to the Image processing toolbox. This system uses Xuggler to convert video into image frames and Opencv to perform further image processing steps such as background subtraction and object detection. After object detection, total vehicle count is determined using parallel processing power of Hadoop.

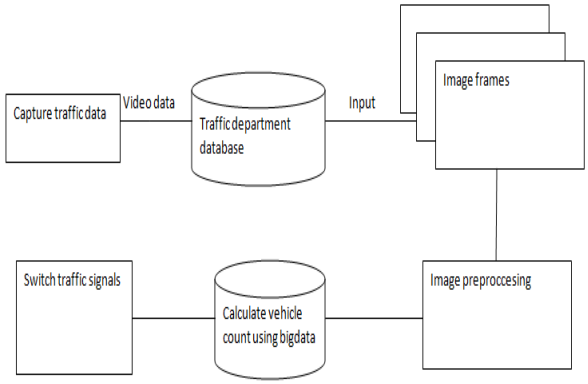

Figure 3: Traffic management system

Conclusion

Big Data analytics tools can help us gain useful insights to enhance the road safety and decrease traffic crashes. This study revealed some common misconceptions about road incidents. Analysis showed that the human behavior has strong impact on traffic flow and safety decisions. This work assesses the Traffic n utilizing diverse AI calculations by WEKA Tool. Think about the outcomes as far as time taken to manufacture the model and its accuracy.This work demonstrates the Random Forest is best classifier for Traffic of WEKA device since it runs productively on extensive datasets. In future we will utilize diverse classifiers on various datasets and assessing the execution of every classifier. This paper proposes another structure to improve the traffic issues in the city. By utilizing huge information methods the traffic the board framework's reaction time can be improved all things considered.

Future Scopes

The proposed system encounters only the traffic management problem. For future prospects this system can also be used for prediction of traffic by determining the vehicle count on all the days of the week. The data obtained can be given to a predictor to predict the vehicle count for the next week. This prediction could be forecast to the citizens for them to find alternate routes in case of emergencies

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