**Literature Review**

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**This review has 10 different research papers based on our project – Automobile cars accidents in Canada**

* **An Improved Deep Learning Model for Traffic Crash Prediction**

This is the model which is based on the data from USA. In USA traffic crashes are the number one cause for death among people. This data is collected from the united states police and state highway-asset-management databases, the analysis of traffic safety estimate and predicate the likelihood of a traffic crash. The proposed model includes two modules, an unsupervised feature learning module to identify functional network between the explanatory variables and the feature representations and a supervised fine-tuning module to perform traffic crash prediction. The number of crashes occurring on a specific time period will be considered as the dependent variable and the and the factors affecting the likelihood of traffic crash are analyzed and examined. The proposed model that includes the MVNB (Multivariate negative binomial) regression layer in the supervised fine-tuning module can better account for differential distribution patterns in traffic crashes across injury severities and provides superior traffic crash predictions. The findings suggest that the proposed model is a superior alternative for traffic crash predictions and the average accuracy of the prediction that was measured by RMSD can be improved by 84.58% and 158.27% compared to the deep learning model without the regression layer and the SVM model, respectively.

* **Traffic accident analysis using Machine learning Paradigms**

This paper is talking about modeling the severity of injury that occurred during traffic accidents and the mechanisms they used for their research work is Artificial neural networks using hybrid learning, decision trees. These techniques can help to understand the characteristics of drivers’ behavior, roadway condition and weather condition that were causally connected with different injury severity. This can help decision makers to formulate better traffic safety control policies.

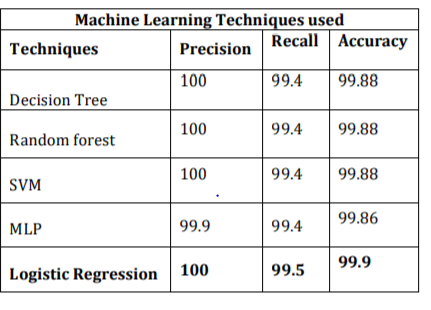
The analysis is focused on vehicle accidents that occurred at signalized intersections. The injury severity was divided into 3 classes no injury, possible injury and fatal injury. They compared the performance of Multi-layered Perceptron (MLP) which is a feed forward neural network with one or more hidden layers and Fuzzy ARTMAP (Adaptive Resonance Theory) and found that the MLP classification accuracy is higher than the Fuzzy ARTMAP. Levenberg-Marquardt algorithm was used for the MLP training and achieved 65.6 and 60.4 percent classification accuracy for the training and testing phases, respectively. The Fuzzy ARTMAP achieved a classification accuracy of 56.1 percent. In Decision tree the performance for no injury, possible injury and fatal injury is 67.54, 64.40, and 89.46. In Hybrid DT-ANN approach the associated accuracies are 83.02% and 65.12%, 74.93% and 63.10%, 91.53% and 90.00%. The future work they are going to focus on to finding out the speed of the vehicles during crashes.

* **Using machine learning to predict car accident risk**

This paper is about Predicting accident risk per road segment per hour within the specified area using ML and the mechanisms they used are supervised machine learning and gradient boosting There are numerous possible applications, including the following that we have considered for applications: Safe route planning, Emergency vehicle allocation, Roadway design, Where to place additional signage (e.g. to warn for curves). The future work they are going to do is to use real time traffic information to improve the model significantly.

* **Machine learning based traffic congestion prediction in a IoT based smart city**

This paper problem statement is Traffic congestion prediction using machine learning and mechanism they are using decision tree, Random forest algorithm, SVP, MLP, Logistic Regression in this model they are using various sensors to analyze the traffic flow and free flowing of traffic. Road traffic is important for faster connectivity and transportation systems. they assume that all the smart cities are well developed and well connected, with all the sensors deployed at the crucial junctions. The data is being gathered from different junction points through different sensors. The data is assumed to be stream data which is time dependent. Our goal is to predict the congestion on any specific path which is about to occur in the due time. They applied five different machine learning techniques with the help of WEKA tool to identify the best method which can predict accurately the traffic congestion. Among this Logistic Regression has outperformed all the other machine learning techniques. The reason for this is that, since the data is time dependent and regression methods are good at predicting for the time dependent data. The metrics used to measure the prediction results are Precision, Accuracy and Recall. Precision is defined as True Positive (true positive+false positive). Recall is defined as True Positive (true positive + false negative). Accuracy is defined as all True values by summation of all True and False values. The future work they are going to do is to do prediction of traffic congestion using hybrid techniques which can give high accurate results. Their prediction result table is below.



* **Vehicle crashes and machine learning**.

This includes predicting crash fatalities with machine learning. The mechanisms used are Regression, Random forest. The Crash Analysis System (CAS) data is available in different formats and APIs. It is simple to grab them through API interfaces, instead of downloading to your local machine. This is beneficial, as we will access the latest updated data every time, we run the Jupyter notebook. This will help to understand the causes and factors that affect the car crash severity. Road accidents constitute a major problem in our societies around the world. For example. In the year 2016, the USA alone had recorded 37, 461 motor vehicle crash-related deaths, averaging around 102 people per day. Roads, speed limit, weather and other related attributes also indicate crash severity as well as fatality level. The modeling part of this problem is approached in different ways. Regression problem will help us predict the number of fatalities based on the attributes of the crash dataset. It can also be approached as a classification problem and predict the severity of the crash based on the crash dataset. Random forest algorithm is also used since it performs well on many datasets. In future this project can be improved by considering more models and evaluating accuracy.

* Live Prediction of traffic accidents risk using machine learning and Google Maps

The dataset is based on UK where the government has published detailed records of traffic accidents in the country dating back to 2002. With the help of this a machine learning model is being made that predicts with high accuracy as to when and where accidents are likely to occur in Greater London. The main aim of this project is to create an interactive traffic accident predictor that would be easily accessible by anyone. The steps undertaken to achieve this objective are – create an interactive model that can identify the accident spots along a driving route with London taking into account the local weather condition during the travel, then Data collection, Data Processing, Supervised Learning and finally Deployment. The algorithms used were Logistic Regression, SVM and Random Forest. Among the models tested, the best performing model was Random Forest trained on all numerical features. This was the model then selected for Deployment. The results of the modelling steps are summarized in the table below:

A screenshot of a cell phone

Description automatically generated

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