Literature Survey

The rapid increase in number of vehicles per year among all the developing countries of the world has also given rise to number of accidents and the rate of the accidents. To understand the reason behind such tremendous increase in number of accidents several studies have been done to find out the patterns behind them and try to find ways to prevent and reduce the rate of accidents. Some of those studies using different methods of machine learning, Data mining are discussed below.

(Saffet Erdogan, Ibrahim Yilmaz, Tamer Baybura & Maevlut Gullu, 2015) have used Geographical Information System (GIS) technology for visualization of accident data and analysis of hot spots in highways. These hot spots were explored and determined using two different methods of Kernel Density analysis and repeatability analysis, which resulted in finding out problematic location such as junctions, cross roads etc. (Mohamed A. Abdel & A. Essam Radwan, 2000) developed a model using Negative Binomial modelling technique to model the frequency of accident occurrence and involvement. The model illustrated the significance of the Annual Average Daily Traffic, lane, shoulder, median width and degree of the horizontal curvature on the frequency of accident. (Juan de Ona, Randa Oqab Mujali & Francisco J. Calvo, 2011) showed the possibility of using Bayesian Networks to classify traffic accidents according to their injury severity. The model based on BNs are able to make predictions without the need of pre-assumptions. BNs are used to classify these accidents according to their injury severity and identifies variables associated with killed or seriously injured based on accident type, age, lightening and number of injuries. (Ursula Buck & Silvio Naether, 2007) tried to analysis the impact of collision by using three-dimensional technologies. They used 3D surface scanning for the documentation of the external body findings and to inflict injuries. The analysis included processing of the 3D models and determination of the driving direction of the vehicle, geometric determination of the impact situation. (Ju-Yeon Lee, Jin-Hyuk Chung & Bongsoo Son, 2008) expressed accident size as the number of involved vehicles, the number of damaged vehicles, the number of deaths or the number of injured and then used a structural equation model to capture complex relationships among variables. (Dianne Parker, Robert West, Steve Strandling & Antony Manstead) used Driver Behaviour Questionnaire, frequency of fast driving and thoroughness in decision making to find out the involvement in main accident types.

(Miao M. Chong, Ajith Abraham & Marcin Paprzycki, 2004) used artificial neural networks and decision trees to model the severity of injuries resulting from traffic accidents and to gain information about the most important factors in fatal injuries. (Nancy Leveson, 2004) used a model based of basic systems theory concepts to provide a theoretical foundation for the introduction of unique new types of accident analysis, hazard analysis, accident prevention strategies including new approaches to designing for safety, risk assessment techniques and approaches to designing performance monitoring and safety metrics. (Mohamed Abdel & Kirolos Haleem, 2011) used multivariate adaptive regression splines (MARS) to predict vehicles’ angle crashes. MARS and Negative Binomial models were fitted and used to estimate the crash angle frequency at unsignalized intersections. (Bai, We and Tsai, 2012) designed a fall monitor system using accelerometers which could analyse the actions of humans such as jumping, sitting etc. Similar kinds of approach can be applied to monitor vehicles too. (Lakshmi and Balakrishnan, 2012) used KNN model to find the nearest hospital based on the accident’s geo location. (Rovsek, 2004) analysed crash data using classification and regression tree algorithm. (Kumar and Toshniwal, 2015) used clustering to partition data into multiple groups and then used Probit model to identify relationships between various characteristics related to accidents. (Depaire, 2008) used latent class clustering on two road user traffic accident data of Belgium. The data was divided into seven clusters and then analysed. (Zhibin Li, Pan Liu, Wei Wang and Chengcheng Xu, 2012) presented the use of Support Vector Machines (SVM) model for crash injury severity analysis and also developed an ordered probit model using the same dataset. (M. R. Lehto and G. S. Sorock, 2018) used Bayesian Inferencing as a machine learning technique to identify pre-crash activity and crash type from accident narrative.

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