

Development of an Intelligent Road Safety Mobile Navigation Application Using Machine Learning for Real-Time Accident Hotspot and Severity Prediction: A Case Study in Sri Lanka

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Abstract

In Sri Lanka as well as other countries, traffic accidents are a leading cause of fatalities. Many factors contribute to the high mortality rate in developing countries. One of the reasons that road accidents occur is that people are unaware of common accident locations. The government has already enforced other tactics, like traffic signals and fines, to reduce these incidents, but they have been ineffective. But if people have a way to change their driving patterns based on the common accident locations, so-called hotspots, we can decrease the road traffic accidents that happen on a daily basis. This study focuses on improving road safety by developing an intelligent road safety mobile navigation application that provides real-time alerts on accident hotspots and severity levels to drivers during their journey on the road. This system uses supervised machine learning for building a most suitable model for accident hotspots and severity prediction that is tailored for Sri Lankan accident data by conducting an in-depth review of existing machine

learning techniques and analysis of historical accident data. According to the re- view, comparison, and evaluation, the final predictive machine learning model was implemented using an XGBoost regression model for the prediction of accident hotspots and a random forest classification model for accident severity prediction. By integrating the implemented predictive model, this study proposes a mechanism to gather real-time accident data and the development of the mobile application, which provides the foundation to revolutionize road safety and enables drivers to make safer decisions on the road.

Keywords: *Machine Learning, Supervised Learning, Regression Algorithms, Classification Algorithms, Predictive Analytics, Hotspots Identification, Severity Analysis*

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