COMPARATIVE ANALYSIS OF MACHINE LEARNING ALGORITHMS FOR ROAD ACCIDENT FORECASTING

Ariyathilake P.B.S.N.[1*] and Rathnayake R.M.K.T.[2]

[1]Department of Computing & Information Systems, Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka, Sri Lanka

[2]Department of Physical Science and Technology, Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka, Sri Lanka

*pbsnariyathilake@std.appsc.ac.lk

The epidemic of road accidents growing rate, excides the need for drastic evoke in road safety within world. The awareness for road accidents has increased within the government and general public, the epidemic of road accidents are increasing an alarming rate. Specific instances which cause social and economic loss for a particular country can be considered as road accidents. Road safety is the most crucial and vital part of a country. The tragedy of the road accident is it mainly affects the developing countries by causing huge human losses and negative emotional effects for people. Therefore to establish an accident prevention, reduction strategies and future forecasting of road accidents with time is a compulsory need. In order to reduce the severity of the road accident and to enhance road safety, a comparative analysis of road accident is performed by using machine learning techniques. The main objective of this study is to identify the most suitable machine learning technique to forecast future accident counts. In this comparative study forecasting capabilities of CART Regression tree, Multi-Layer Perceptron (MLP), Support Vector Regression (SVR), Long-Short Term Memory (LSTM) and Autoregressive Integrated Moving Average (ARIMA) were studied and compared. The comparison was conducted by studying efficiency of algorithms and forecasting of road accidents data. The results revealed that Long-Short Term Memory (LSTM) provides forecasts which are similar to the actual predictions with a Root Mean Squad Error (RMSE) of 146.23 while other techniques only were able to achieve higher RMSE. Multi-Layer Perceptron (MLP) was able to achieve RMSE of 330.38 which is not effective as the LSTM. Although several researchers were focused on comparing ARIMA and the Neural Networks, less number of studies focus on comparing several techniques in machine learning. In this study researcher is focus on forecasting road accident rate by using different machine learning techniques. The identified LSTM approach will provide effective results when using it as a road accident forecasting model. The study will provide the necessary information to guide the relevant decision-makers in adopting suitable measures to reduce the accident rate.

Keywords: *CART Regression tree, MLP, SVR, LSTM, ARIMA*