# Machine learning algorithms performance evaluation in traffic flow prediction

**Abstract**

The important reasons for traffic congestion are classified into some categories. Some of the main reasons for traffic congestion are work zones, weather, special events, traffic incidents. This bad condition of weather makes changes the behavior in the driver and the traffic flow is affected. Accurate traffic prediction is important for the road user's traffic system administrators. Communication technology is influenced by various domains. Due to the advancement of technology machine learning concepts are used in traffic forecasting. This proposed model uses four types of machine learning concepts like DAN(Deep Autoencoder), DBN(Deep Belief Network), RF(Random Forest), and LSTM (Long Short Term Memory). The performance of the proposed model can be measured by using the accuracy, precision, recall, and error value metrics of machine learning approaches. From the four approaches, LSTM generates 95.2% accuracy.

**Introduction**

In transportation means, congestion is defined as the excess of vehicles on the roads within a particular time which results in the slower speeds of vehicles comparing with the normal situation. The word congestion refers to the meaning of stopped or stop-and-go traffic. Work zones are the construction which is made on the roadway side that makes physical changes for the particular environment. These work zones also include the less width or number if travel plans, absence of shoulders, diversions, and temporary roads. Then the weather is considered as the most important reason for traffic congestion. The weather conditions which affect the traffic are as follows, bright, sunlight, fog, wet, snowy, icy roadway after the precipitation state. Special occasions cause surges in the traffic demand which overwhelm the system. But weather which leads to poor visibility and causes crashes and makes the surface of the roads slippery. This digital world machine learning techniques are one of the important research topics. Recently in traffic prediction system also uses machine learning approaches. This system is mainly by common people to know about the traffic flow. This research uses DAN, DBN, DF, and LSTM techniques to predict traffic flow. The proposed system is tested with an online dataset and it is implemented by using Python programming.

**Section snippets**

**Literature review**

For predicting traffic conditions the real data collected from the road network. In most cases, false or incomplete information is collected form automobile detectors. T. Pamuła et al. uses deep learning techniques and multilayer perceptrons with autoencoders to predict the traffic [3].

D. Chen et al., proposes a new model AE-GRU(AutoEncoder Gated Recurrent Unit) to reduce the issue of less forecasting accuracy in traffic flow forecasting. This system considers the importance of stream

**DAN**

A deep autoencoder is an algorithm that is composed of symmetrical deep networks that have four or five shallow layers mentioning the encoding half of the net and the second set of five or four layers which makes the decoding half. Deep autoencoders have the ability for minimizing images into 30 number vectors. This autoencoder is a neural network model that seeks to study a compressed representation of the input. Autoencoder is the unsupervised method of learning. However technically, they are

**RF**

RF is one of the easiest and flexible machine learning techniques to produces a better result. Due to the simplicity, it is used by many people. The following Fig. 2 shows the normal process flow of the DF technique (H. Jiang et al.,).

RF forest technique was initially introduced by Leo Breiman. This technique use number of training data to improve the variation among the classification system, thus increase the abstraction capability and forecasting capability of the technique. This approach is

**LSTM**

LSTM approach is used in various applications like generate music, speech identification, and translate machines. It increases the unseen layer cell using RNN. LSTM attaches three memory parts like input gate, output gate, and forget gate. The memory unit controls the information and makes the decision about which data should retain and removed. Upstream downstream traffic flow also affects the traffic of concern places. The LSTM contains two types of input data: the features of downstream and

**Performace evaluation**

The performace of the proposed system is assesed by using accuracy, MSE(Mean Squared Error), RMSE(Root Mean Square Error), precision and recall. The Eqs. (13), (14), (15), (16), (17) are used to calculate the metrics value of the proposed system

**Result and discussion**

Traffic flow forecasting plays a significant part in the smart transport system. Smart transport management system needed to assess the traffic condition in efficient manner. Various parameters are used to predict the traffic flow in urban areas. The important parameters used in this research work are zone type, whether condition, day, road capaciy and vehicle types. The data collected from on on line web site and develop the prediction using four machine learning concepts.

## Conclusion

The efficiency of the traffic prediction system is measured by the accuracy of the prediction result. The main intention of this current research work is to develop a traffic prediction system using machine learning techniques. Here the system developed by using DAN, DBN, RF, and LSTM techniques. finally, the performance of the system can be evaluated in terms of accuracy, precision, recall, RMSE, and MSE metrics. Among the four techniques, LSTM yields a better accuracy level. This system is