Chapter 2
Comparing Machine Learning Models for the Predictions of Speed in Smart Transportation Systems

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ABSTRACT

In today's world of advanced technologies in IoT and ITS in smart cities scenarios, there are many different projections such as improved data propagation in smart roads and cooperative transportation networks, autonomous and continuously connected vehicles, and low latency applications in high capacity environments and heterogeneous connectivity and speed. This chapter presents the performance of the speed of vehicles on roadways employing machine learning methods. Input variable for each learning algorithm is the density that is measured as vehicle per mile and volume that is measured as vehicle per hour. And the result shows that the output variable is the speed that is measured as miles per hour represent the performance of each algorithm. The performance of machine learning algorithms is calculated by comparing the result of predictions made by different machine learning algorithms with true speed using the histogram. A result recommends that speed is varying according to the histogram.

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INTRODUCTION

With the advancement of the Intelligent Transport System (ITS) and the Internet of things (IoT), logistic and mobility are improved by reducing traffic-related problems. It provides users with prior information regarding traffic details such as traffic congestions, traffic controls, improving traffic safety, gathering traffic data, and parking management which helps in reducing travel time also enhances the safety and comfort of the users in smart cities. The Intelligent transportation system is progressing from a technology-oriented autonomous system to a data-driven integrated system. ITS applications are depended on the quality and size of the data (Zhang et al., 2011). With the availability of data, it is feasible to classify patterns such as the flow of traffic and behavior of a specific user in different traffic conditions to predict future trends and increase the effectiveness of the existing transportation system.

Information such as speed, rotation vector, and acceleration can be tracked and achieved from smartphones using a built-in global positioning system (GPS), sensors, and accelerometer (Susi et al., 2013) (Amtul W et al., 2020). By using these data user's transportation approaches can be recognized and can be used in different applications such as safety, transportation planning, information provision, and environment. By choosing the optimal route for delivering goods and packages to the destination by a secure monitored setup can reduce product delivery time. Many use cases are applicable in such logistics consisting of road traffic congestion solutions with sensors installed on roads and cloud-integrated systems that count, classify and detect vehicles commuting on roads through advanced ML (Machine Learning) techniques, data mining, and artificial neural networks. The setup intensive monitoring includes inclinometers and investigations for humidity and water on the road surface permit maintenance and alert driver or autonomous car for event-based driving inhomogeneous environment. Predictions are done in a real-time approach and compared with the sensed ones certifying zero error on the measurement.

In this paper, we provide an in-depth experimental valuation of the possibility of improving the overall speed that is measured as miles per hour represent the performance of each algorithm by hierarchical framework classifier and by observing structured set preview service realization by different ML models. By comparing several different features and substitute means to collect historical data with different predictive density, volume, and speed. Precisely, the organization of the paper is as follows. After presenting Introduction in section-1, background information of previous related studies is defined in section-2. Section-3 outlines Understanding data, its problem, data collection, data fusion, and data pre-processing. Section-4 represents the methodology of machine learning techniques. Section-5 outlines datasets used then Section-6 valuation of different machine learning methods for the prediction of speeds. Results are defined in Section-7. Finally, the conclusion of the paper is in section-8.

BACKGROUND

To differentiate between different transportation methods researchers have developed many techniques using mobile phones and visual tracking (Wang et al., 2017) (Kwapisz et al., 2011). A wide range of computational learning task types are addressed as active and comprising of several paradigms in machine learning (Bacciu et al., 2012). To build a detection model with high accuracy machine learning techniques are extensively used.