# Chapter 3
# Transport Data Analytics With Selection of Tools and Techniques

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## ABSTRACT

*Emergency medical services (EMS) are inevitable in urban transport. The sustainable transport services during emergency situations are inevitable. These emergency services and vehicle operations are influenced by traffic flow rate on highways. The objective of this chapter is to present the use of transport data analytics in sustainable mobility and transport. Travel time is a key factor in emergency vehicle operations as the urban transport system is a time varying network. Temporal traffic information is a source for estimation of travel time on highways in emergency vehicle operations. The adverse traffic behavior during peak and non-peak hours of daily traffic profile hinders the operation of emergency vehicles during pandemic COVID-19 situations and so forth in evacuation planning when situation arises. Hence, this chapter presents the modern techniques and tools used in estimation of traffic flow rate on highways to access the connectivity of road network for emergency vehicle operations.*

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## INTRODUCTION

Urban transport system is a time varying network. Traffic congestion induces unpredicted delay in travel time. The traffic flow rate on highways at temporal scales contributes in travel time computation in successive time instances. Formulation of Sequence Convolution based auto-encoder Long Short term Memory (SCAE-LSTM) network aims at sequencing the temporal traffic flow rate in preceding time instance to estimate the traffic flow in successive time instances. Given origin and destination (OD) pair, temporal traffic sequence helps in estimating traffic flow rate on highways. Hence, Spatial-TemporAl Reconnect (STAR) algorithm is proposed. The performance of STAR is investigated by conducting extensive experimentation on real traffic network of Chennai Metropolitan City.

The computational complexity of the algorithm is empirically analyzed. The proposed STAR algorithm is found to estimate traffic flow during peak hour traffic with reduced complexity in computation compared to other baseline methods in short term traffic flow predictions like LSTM, ConvLSTM and GRNN. Finally, conclusions on results are presented with directions for future research.

This chapter is organized to present the back ground on recent achievement followed by formulation of Sequence Convolution Auto-Encoder Long short term memory network with focus on time complexity measures. Finally, the chapter summarizes the work with directions for future research.

## BACKGROUND

Recent advancements in Intelligent Transport Systems (ITS) have revolved the transport industry nationwide across the globe to serve the public in better way. Traffic flow congestion estimation and management on highways is always in demand worldwide across all nations for safe and hassle-free travel. Traffic congestion problem is inherent in travel time decisions and solving such problem is essential for travel guidance especially during peak hours of a journey. In early 1990's automated traffic controller was introduced (Bauer, 2009; Batz et al., 2010, 2013) and the two broad spectrums of research in transportation that is everlasting in infrastructure planning are (i) Shortest path computation problem and (ii) Time series traffic forecasting. In spite of technology driven traffic management using IoV (Internet of Vehicles), monitoring and control of vehicular traffic remains a serious issue in real time thus, a fully automated traffic management system is not feasible. Therefore, it is essential to manage traffic flow congestion systematically as it cannot be avoided but can be mitigated (Chen et al., 2014; Wu et al., 2016). In this view, a speedup technique is necessary to bridge the gap between traffic flow estimation and path routing