Chapter 3
Data Analytics With Selection of Tools and Techniques

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ABSTRACT

Highway traffic profiling is an essential service for the deployment of intelligent transport system (ITS) in Chennai metropolitan city. Recently, a traffic sequence mining framework was developed for the prediction of traffic flow on highways. Real-time traffic flow rate of the state highway SH-49 was collected under the authority and supervision of Tamil Nadu Road Development Corporation (TNRDC). The objective of this investigation is to deploy electronic traffic profiling with all essential services for highway traffic operations. The implementation of traffic sequence mining framework done earlier has highly motivated the authors to extend the present work to E-Traffic alert, a highway traffic profiling system that disseminates the dynamic traffic flow rate to commuters when deployed as mobile application and an interactive analytic tool for traffic operations when deployed as desktop web application.

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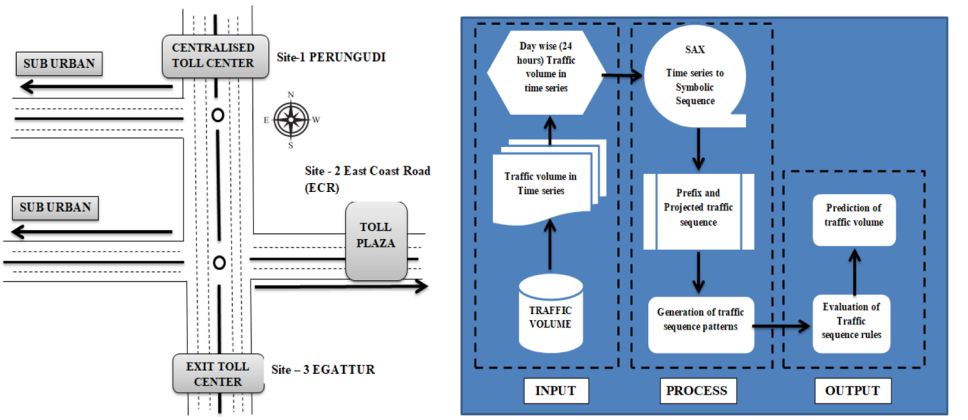
INTRODUCTION

In our recent work, 2017 – 2020 (Jayanthi and Jothilakshmi, 2019, 2021; Jayanthi and García Márquez, 2021a, 2021b; Jayanthi, García Márquez, and Ragavendra Prasad, 2022, Jayanthi, 2023) travel time based traffic information sequence was formulated and implemented in a traffic information sequence mining framework. The framework shown in Figure.1.(b) was developed for the prediction of traffic flow on highways using the data set recorded at the centralized toll center shown in Figure.1.(a). Real time traffic volume data for 52 weeks is collected at a centralized toll system comprising all toll collection centers at three different sites in Chennai city, namely, (i) Site-1: Perungudi- Seevaram, the entry Toll Plaza (ii) Site-2: ECR link Road, and (iii) Site-3: Egattur, the exit toll plaza. The data services of these three sites are under the authority of TNRDC. The research findings reported that traffic volume on highways can be predicted by mining travel time based traffic information sequence and it is feasible to deploy the framework in any suitable location.

Figure 1. (a) TNRDC Centralized Toll Center (b) Traffic Sequence Mining Framework



The availability of historical traffic flow rate and connectivity of sites has motivated authors to formulate highway traffic profiling system that has following objectives.

1. To capture the dynamics of physical traffic flow by an Extract-Transform-Load (ETL) data pipeline design for the representation of raw traffic count.
2. To design a machine learning pipeline that augments the traffic sequence mining framework with vehicle speed based on multi-criteria decision making support for profiling the highway traffic.