Abstract: Traffic Prediction and Minimising Delays at Junction

Vatsal Mehta, Vaibhav Gandhi and Glenford Mapp

Middlesex University, London, United Kingdom

Transportation accessibility greatly represents and influences regional social-economic development. The demand for passenger transportation, especially by road, has been increasing due to the globalization process, resulting in delays and traffic congestion. However with the deployment of modern technology such as Satellite Navigation systems and modern vehicular networks, it is possible to know the exact state of vehicles including their sources and destinations of travel. This allows us to explore new traffic analysis based on the journeys of vehicles within the system to reduce traffic delays and congestion. This paper aims to address these challenges in particular, the congestion at road junctions, using a Zero Server Markov chain technique, which is an analytical model that has been developed to obtain average delays and average numbers of vehicles at a junction. In normal traffic analysis, Dijkstra's algorithm is used but the time at the junction is usually estimated. Our new approach, using Queueing Theory, allows a more detailed analysis of delays at junction and hence more accurate end-to-end journey times. In addition, using a probabilistic approach based on cars turning left, going straight, or turning right at a junction obtained from traffic data available from Highways England, it is possible to acquire accurate input/output flows of traffic at the junction. Secondly, this paper will incorporate these findings into the analysis of journey times using the OSHI (Operating System and Hardware Information) Platform. Finally, these new techniques and results will then be used to minimise the journey times on the MIDDLESEX University VANET Testbed which is a real-time vehicular network in London (UK).