ABSTRACT

In the last decade, utilisation of Vehicular Ad hoc Network (VANET) to estimate vehicular traffic density arises. However, former approaches only take number of vehicles without bothering the types. Meanwhile, different vehicle type brings different impact on traffic performance. Research covered in this thesis is proposed method to include vehicle classification in VANET-utilised density estimation technique.

At first, a simple application layer that made use of the available network packet in VANET is proposed. The simple model will attach vehicle id and type in sent packets. Later, each time another node receive the packet, it will read the data and calculate density caused by various vehicle types. The second model is based on the first model. This model is able to estimate density and predict congestion based on proportion between current volume and the road capacity, or also known as Volume-to-Capacity (VC) Ratio. If the VC Ratio exceeds the threshold, an emergency message will be send. This emergency message contains the congested road id. Both models were implemented into computer simulation for validation and evaluation. The validation results show that each model worked as expected.

Evaluation using statistical methods of the advanced model shows that provided information could improve road performance in terms of density, occupancy, travel time and speed when there were a lot of heavy vehicles on the road. For example, in term of traffic density the medians of non VANET scenario, with VANET but without types distinction, and with types distinction during simulation of standard vehicle types distribution are 519.50, 385.90, and 446.1, respectively. However if there are more HVs on the road, the medians are 360.30, 369.60, and 284.30 for non VANET scenario, with VANET without types distinction, and with both functions, respectively.

Keywords: Level of Service, VANET, V2X communication, ITS.