

Title: Research on Dynamic Guidance Decision Algorithm in Intelligent Transportation Systems

Name: Qi Zhao

Supervisor: Jie Lin

ABSTRACT

In an Intelligent Transportation Systems (ITS), to determine a non-blocking and minimum time cost guidance route from the departure point to the destination is so important for a vehicle driver. Thus, many static dynamic route guidance decision algorithms have been designed so far to help vehicle drivers determine such an optimal driving route.

In this paper, we analysis several widely used guidance decision algorithms, and then we propose a Dynamic real-time Route Guidance algorithm using En-route judgement and decision(DRGE), which is based on real-time traffic information and can en-route make decision whether to form a better guidance route or not. Our DRGE algorithm uses mesh network technology to reduce economical cost and at the same time to improve the efficiency of information transmission, for the technology relies on wireless communication among vehicles rather than fixed infrastructures. More importantly, DRGE considers the production and transmission of real-time vehicle parameters. With the help of these shared real-time vehicle parameters and traffic information, DRGE introduces the trust probability (TP) to predict future traffic conditions and use it to help drivers en-route find a better guidance route. Moreover, DRGE also considers the effect of external factors (such as bad weather or sudden traffic incidents) on roads, and it can take quick actions to deal with these different situations.

Based on a complete theoretical research, from two aspects of the time efficiency and balance efficiency, we analysis the practicability of DRGE under three different traffic conditions (light traffic, heavy traffic and moderate traffic). Through our research, we have theoretically proved that DRGE performs very well under different traffic conditions, and it can improve the traffic efficiency of an intelligent transportation system.

We have also done a series of simulation experiments on DRGE algorithm using a virtual small intelligent transportation system model. Through four groups of parameters under different conditions, our data shows that comparing to the existing route guidance schemes, DRGE algorithm an effectively mitigate traffic congestions due to the sudden increase in the number of vehicles and greatly reduce the average driving time of vehicles in road.

KEY WORDS: Intelligent transportation system; Dynamic route guidance; Traffic conditions; Real-time traffic information