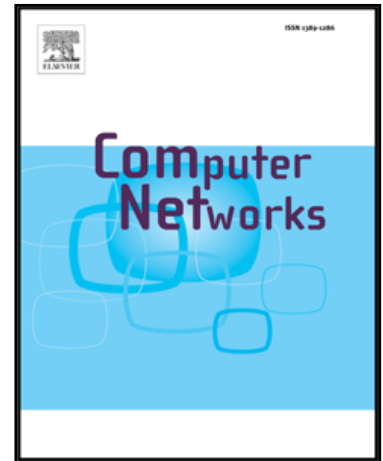


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Reliable Vehicle Type Recognition based on Information Fusion in Multiple Sensor Networks

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Abstract— With the purpose to improve the real-time performance and accuracy of vehicle type recognition in complex traffic scenes, this paper proposed an information fusion based vehicle type recognition method. Firstly, the multiple sensor network built of geomagnetic sensors is described, whose characteristics include easy deployment and being budget friendly. Then, the vehicle type recognition method for the proposed multiple sensor network is applied. The main innovation of the method is matching the data collected by multiple sensors to form a fusion feature waveform for a single vehicle. Finally, the experimental results showed that the proposed method had 95% accuracy for small vehicles (Passenger vehicles and Sport utility vehicles) and 90% accuracy for large vehicles (Buses and Vans) approximately, which can provide a reference for multiple sensor network design and traffic data collection.

Keywords: vehicle type recognition, geomagnetic sensors, information fusion, wireless sensor network.

I. INTRODUCTION

With the rapid development of national economy and the constant enlargement of the city scale, people's demand for an efficient transportation system is especially urgent in smart cities[1]. Intelligent perception of urban traffic is the basis of transportation system in the smart city, and it also plays a fundamental role in traffic management and planning. With the intelligent perception of the urban traffic, different kinds of detectors become more and more available for urban roads, which can provide a better understanding of the complex traffic status for city managers and decision makers[2].

Deployment of a large number of sensors is a valid method to obtain the information of current system infrastructure and traffic load. Multiple sensor networks are a crucial method for an observable and controllable transportation system. With the expansion of the scale in urban transportation system, resource consumption, traffic congestion, traffic pollution and other issues are emerged to impose an influence on the urban construction toward smart cities. Therefore, with the aim of solving the problems, the multiple sensor networks are essential to intelligent transportation system.

The intelligent transportation system was first proposed by U.S. Department of transportation in 1995[3]. They planned to fully put the system into use in 2025. The system includes advanced sensor technology, data communication technology, cybernetics, information technology and computer science. These technologies are arranged to apply to urban traffic mass sensing and management, establish a full coverage, multi dimension scale intelligent transportation management system. The system uses the running state of the ubiquitous sensor network to monitor the current transportation system, ensuring all transportation vehicles in the optimal operation state of high efficiency and low energy consumption, recommends optimal route and sends warnings to the potential security faults as well as traffic accidents[4].

Nowadays, sensor networks have been widely used in roads, highways, bridges and tunnels. Commonly used sensors include: Fiber Bragg grating sensors, stress and strain sensors, displacement sensors, wind speed sensors, temperature sensors, and humidity

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