Study on Path Optimization Method of Traffic Guidance System under the Condition of the Car Networking

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**Abstract.** Intelligent Transportation System is the primary means of solving the city traffic problem. The information technology, the communication, the electronic control technology and the system integration technology and so on applies effectively in the transportation system by researching rationale model, thus establishes real-time, accurate, the highly effective traffic management system plays the role in the wide range. Traffic flow guidance system is one of cores of Intelligent Transportation Systems. It is based on modern technologies, such as computer, communication network, and so on. Supplying the most superior travel way and the real-time transportation information according to the beginning and ending point of the journey. The journey can promptly understand in the transportation status of road network according to the guidance system, then choosing the best route to reach destination.

**Introduction**

City traffic with the contradiction is between economic and social development of their increasingly prominent. Traffic congestion, traffic accidents, traffic pollution and energy consumption are urgent problems to be solved at present. People have been aware of the traditional multi-road has not fundamentally curb worsening traffic. Since the beginning of the last century the implementation of intelligent traffic system is as the main means of solving the contradiction of intestine and the future directions of research and development, through high-tech means to change the backward traffic control. Traffic management is so as to maximize the efficiency of transportation [1]. The focus is on the induced traffic subsystem in intelligent transportation system.

City traffic flow referred to as the guidance system is using the global positioning system. Electronic traffic map that is computers and advanced communication technology, display the current position of the vehicle. The road traffic network and road traffic situation in the on-board computer is driver specified the optimal route to destination and guides the driver's driving [2]. Guidance system can effectively reduce the residence time of vehicles on the link prevent the occurrence of traffic jams. The optimal allocation is finally achieved in road traffic flow.

Transportation is the lifeline of the city function. It has a direct impact on all aspects of social economy, the production and life. With the rapid development of social progress and economic, city traffic increases rapidly [3]. Traffic congestion has become one of the urgent problems of modern society. In the automobile industry development, the density of road network is period traffic congestion problem by road and bridge construction. Road widening and other measures to alleviate the contradiction have achieved good results in a certain period of time [4]. But in the century, with the development of economy the traffic situation is deteriorating, traffic congestion, traffic accidents and environmental pollution. Energy shortage has become a common problem facing the world.
The Key Technology of City Traffic Flow Guidance System

Four key steps of traffic flow guidance system is the information acquisition and processing. Traffic information service system is vehicle location and path optimization of traffic flow [5]. City road network is seen as Fig. 1. To form a unified whole through information technology communication technology, electronic technology, computer technology and other support traffic guidance system.

![Fig. 1. City road network](image)

Acquisition of traffic guidance information is the base of route guidance, including road condition information, weather information and traffic information. The traffic information and traffic flow have road occupancy rate, travel time and the crowded degree. City traffic network topology modeling is seen as Fig. 2. Information status and weather road according to the relevant departments of the information data are available. The traffic information needs to be collected in transportation system.

![Fig. 2. City traffic network topology modeling](image)

Traffic information service is the purpose of the traffic information safe and accurate release out, including the pre trip travel information related to destination information, real-time dynamic traffic information, route guidance information and public information. The working process for the dynamic traffic information collected and other traffic information data processed and sent to the data bus. The system is responsible for information retrieving data from the information platform based on the user's needs as well as the content to be transmitted and then sent to the user.

Vehicle positioning system is mainly through the positioning to determine the exact position in the road network in vehicle. The main research contents through the difference theory and technology, correct the error, improve the positioning accuracy of fault self diagnosis to establish communication network, vehicle position calibration.

Path optimization is based on the position in the road network of travelers to reach the destination and vehicle, combined with real-time traffic information. Developing to make travelers to avoid congestion points and traffic accident, quickly reach the route destination according to travelers driving fixed line feasibility. Identify the best path to travel. The trip is before or in the process of running. Traffic information center on the basis of determining vehicle is to provide travel destination and the location of the vehicle travel time from the real-time database retrieval of relevant network link prediction data.
The Establishment of Game Model of Path Optimization Method

Game theory is the theory to analyze the optimal decision problem under conditions conflict against using rigorous mathematical model and a mathematical theory and method research has struggle or competitive nature phenomenon. The map between two points of the road is seen as Fig. 3. In general, game theory is the study of decision-making in the information structure known how to make decisions to maximize their own interests, and reached the decision between different decision making body equilibrium. Any time the concept of game theory can be used in several actors act mutually dependent and say the game theory has profound social background. In the social system, there are many actors interdependent phenomenon.

Fig. 3. The map between two points of the road

According to the different makers, traffic system objectives can be divided into four parts. The traffic operation is to improve the traffic safety improvement. The improvement of the environment and the improvement are of social resources. The traffic network from point A to point E is seen as Fig. 4. The general managers to make better use of traffic facilities, the traffic network makes full use avoids individual lots of badly run and affect the overall network utilization. The traveler general expectations are running in the network time as short as possible. The transportation infrastructure has improved continuously at the same time traffic environment better more comfortable. For the two different goals, it can be accomplished through the effective management and use of the traffic system.

Fig. 4. The traffic network from point A to point E

Each road besides the digital map \((t_i, t_j)\) meaning is: \(t_i\) said travelers in the choice of anterior segment \(x\) travel time, is also the road \(x\) unsaturated traffic flow when the running time. The unit min link travel time \(t_j\) said travelers choose all sections of \(X\), is also the road \(x\) vehicle has been after saturation of the travel time of the unit min.

Path Optimization Method based on GIS

The expression intensity vector model for multidimensional entities is strong. The three basic forms of point, line and surface description can clear geographical entity that contains with the combination of connected. Connection topology relation and entity data and attribute data can be extended to
express entity with a simple illustration to make the expression more vivid. A typical 20-node random network is seen as Fig. 5. The vector model is more conducive to query geographic information. The road network optimization is analysis of spatial relations.

![Fig. 5. A typical 20-node random network](image)

Road information network nodes, network is the basic elements of data model to be stored in a reasonable and convenient query use. City traffic network graph was first converted into vector. Vector map are organized in layers. Each layer is stored for a class of information or special. Description of spatial data and attribute data object is stored separately.

Conclusions

In recent years, the rapid development of intelligent traffic and traffic guidance system has already been applied in many cities. Coordinate system is induced by the vehicle guidance system and the car makes the implementation of city traffic problems were improved to a certain extent. Traffic system is composed of several parts induction. To solve path optimization using classical game theory, the travelers and traffic network is as a player, through process analysis in game. The path optimization model is based on game theory. The traffic network map set of vector data structure model using geographic information system according to the selection criteria of different actors using system analysis function of road network in the path is optimized respectively for the optimal path travel requirements.

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