Research on Guidance Model of Urban Transportation Based on Big Data Mining Technology

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Abstract: With the increase of population pressure in modern society, the problem of traffic congestion becomes more and more serious. Traffic guidance model is one of the main means to alleviate traffic problems. This paper analyzes basic functions the city traffic guidance model should have, including real-time monitoring, intelligent control and accurate prediction, and gives a method of model construction of city traffic guidance based on big data mining to provide some references for the relative researchers.
Keywords: Guidance Model; Urban Transportation; Big Data Mining Technology

1. INTRODUCTION

With the expansion of urban scale and the increase of urban population, the urban traffic problem is becoming more and more serious. In recent years, most of our city to improve its transportation have made great efforts, the local governments have invested heavily in the construction of traffic infrastructure, and set up a traffic information system using information technology effectively into the political, economic and social development. At present, most cities have initially configured the corresponding traffic management system, equipped with different hardware systems. However, these systems are either introduced or developed by themselves. More of them are simple integration of hardware, and their role in improving urban traffic is not obvious enough. Because of the sharing of information resources among these systems, there is a lack of large-scale system planning. Data mining is a nontrivial process that identifies effective, novel, potentially useful, and ultimately understandable patterns from many incomplete, noisy, fuzzy, random data sets. It is a wide range of cross disciplines, including machine learning, mathematical statistics, neural networks, databases, pattern recognition, rough sets, fuzzy mathematics and other related technologies. At present, data mining based on data warehouse is gradually being praised by people. Data mining involves extracting, cleaning, converting, and loading data. This process is time-consuming. If the data warehouse has already done the above work, it can avoid extracting and cleaning the data every time. The data in the data warehouse is organized by topic, which provides convenience for data mining to select the appropriate data source. Data warehouse can store historical data, so knowledge can be excavated directly in data warehouse.

2. FUNCTIONAL REQUIREMENTS OF GUIDANCE MODEL OF URBAN TRANSPORTATION

(1) Real-time monitoring

In traffic coordination system, traffic guidance system is a very important control method. Traffic guidance is mainly based on specific road conditions for vehicle information and vehicle flow estimation, and through the destination calculation to provide the optimal route plan. This way can effectively improve people's road use efficiency. Traffic guidance has two main objectives: one is to realize the regulation of circulation of the road from the macro, balancing network traffic flow, to achieve each net ability into full play, and then on the whole traffic network optimization; another is analyzed from microcosmic point of view, so that every car can in between the crude and the destination to shorten the shape distance, reduce travel time, which will be released more road space. The connection between traffic control system and traffic guidance system is different. Even for the same road environment system, the management effect is different. On the one hand, by the different time the traffic conditions are not the same, but on the other hand, different environment to adopt the management mode is not the same, so it naturally caused a traffic control system and traffic guidance system of the difference between. Therefore, we can think that the relation between traffic guidance system and traffic control system is interrelated, complementary and independent. Each has its management focus. In the city road optimization management and coordination process, should make comprehensive use of the traffic control system and guidance system, make two kinds of management system of complementary advantages, dynamic coordination, common coordinate optimization of city road system. This is also an important trend in the future development of urban road management and optimization system.

(2) Intelligent control

City traffic control network, first needs to carry on the intelligent control of the city traffic network, which is the main purpose of the intelligent traffic

engineering construction, and control of the traffic signal is the precondition of city intelligent traffic management system, through the network to complete the city traffic signal control. The city traffic environment, and road traffic and pedestrian integration, with high complexity, and there are still uncertainties and dynamic characteristics in the process of transportation system in large scale network structure of the distributed traffic signal control has resulted in considerable challenges. City traffic signal control state, and the signal of city traffic delays and other measures can be controlled by controlling the phenomenon, and the adjustment of this traffic signal can effectively improve the operation efficiency of the traffic system, so for the city traffic congestion, traffic signal control has become the most effective way. Traffic lights were originally controlled only by fixed timing, which was automatic control, which was significant at first, because the traffic was relatively small at that time. However, with the development of the city, the increase of traffic flow and the increase of the randomness of traffic flow, this kind of single fixed control mode cannot adapt to the development of the city. The multi - time flexible timing scheme has become the most widely used method and has fixed timing controller. From the way of traffic control, traffic control is mainly through the direct control of traffic signal facilities to achieve the control of vehicles and pedestrians, improve the effectiveness of road use and reduce the occurrence of obstacles.We solve the problem of traffic congestion and provide convenience for people to travel.

 (3) Accurate prediction

The traffic flow is a short-term unsteady flow, and the dynamic traffic assignment of urban traffic network takes the changing traffic demand as the object, and carries out the dynamic distribution of traffic flow. Therefore, dynamic analysis of the formation, propagation and disappearance of traffic flow is necessary. Unsteady city traffic flow on the short-term dynamic analysis in real time, to produce a variety of random city in city traffic network traffic flow phenomena are more accurate and more widely, which is an important part of the dynamic analysis of traffic demand and traffic network. For real-time traffic flow analysis, the accuracy of the actual trip impedance function plays an extremely important role. Considering the traffic flow time function of the current section, combined with the inflow flow of the current road section, the accurate description of trip impedance is the basic problem that the traffic guidance system needs to solve. In addition, the modern traffic control system needs a precise theoretical analysis of the mixed traffic model to ensure the understanding of road traffic and make the control results more reliable. At the same time, the stochastic uncertainty of urban traffic network also increases the difficulty of traffic signal control. How

to enhance the adaptive ability of traffic signal control system is another difficult point of the intelligent transportation network research. At present, the station passenger flow forecast by most existing rail transit AFC system on-line analysis processing subsystem for the passenger origin destination. These methods not only to ensure its accuracy, and because the passenger station information can only be entered in the finished whole travel process, calculated using the historical data of rail transit network traffic flow, the transfer section, trains loaded with the rate of passenger flow index has lagged greatly, it is necessary to carry out more precise positioning for passengers.

3. APPLICATIONS OF BIG DATA MINING TECHNOLOGY IN THE GUIDANCE MODEL OF URBAN TRANSPORTATION

(1) Collection of big data

The main function of the traffic information collection subsystem is to detect the traffic flow information of the road covered by the system in real-time, and upload it to the control center through the communication network. City traffic information collection method can be used as follows: artificial alarm traffic data acquisition mode, based on the geomagnetic coil mode based on microwave detection, based on wireless geomagnetic data acquisition mode, based on video detection system based on license plate model, grade data, high-definition signal control system based on the data acquisition mode, based on floating car GPS data acquisition mode. The artificial alarm traffic data collection model mainly provides and releases traffic jam information by road surface duty, traffic police or traffic participant through radio station and other means. Coil detector is the traditional vehicle traffic detector, by embedding a loop in the road when changes will cause the detector coil magnetic field, are calculated based on the traffic flow, share, can also use the loop average effective length to calculate the vehicle speed. Microwave vehicle detection system adopts radar microwave detection technology. When the vehicle is detected through the microwave detection area, it will detect the traffic parameters on the lane. Generally, video inspection system is composed of video camera, microprocessor based computer and processing software. Video detection is a new type of acquisition technology which combines video images and pattern recognition into the traffic field. After the continuous video images are transformed into discrete digital images, the traffic parameters such as traffic flow can be obtained by software analysis and processing. The video tracking system with vehicle tracking function can also confirm the vehicle's turning and lane changing.

 (2) Analysis of big data

The large traffic flow and the multi label collision problem in urban rail transit, the deterministic anti-collision algorithm is usually adopted in the ultra-

high frequency band. Compared with other deterministic tag anti-collision algorithms, this algorithm has the advantage of minimizing the number of iterations in the case of large number of tags. For each user's request, construct a tree, each branch is either a new decision point, or a leaf node. Search by using the breadth first algorithm in decision tree traversal process along from the user requirements, will lead to different branches, finally reach a leaf node, each leaf node will determine the corresponding site, through to the judge to determine whether to meet the needs of users. For example: a place in the East, the starting point and end in the input one after another, the query is the key to determine in the East, the decision tree can achieve this function. During the operation, all the search results are stored in the temporary table, so that a large amount of data is stored in memory and a large amount of system resources are wasted. Temporary tables are automatically deleted as the search starts and the program runs off. The connection between the data result and the drawing program is linked by the same site name between the tables, and the program is connected by query. According to the search results, draw the user needs navigation electronic map. The start, site information tables, and alias building tables are created and maintained by manual intervention. With the operation of the system, the change of city traffic, traffic route and station system will use the dynamic sequence database technology added changed, with the function of data mining to be constantly self-improvement. Thus, as the number of applications increases, the whole system will become more and more reliable.

(3) Presentation of big data

According to the data of passenger information system and RFID system, for the media to provide intuitive display terminal line to passenger congestion information, the distribution of the number of car information, pay channel information to the regional traffic density and vehicle guidance station, passengers effectively avoid blocking car. Set up a variable information board, through graphics, text, etc., to show passengers in the subway paid area real-time passenger flow status. Set the line color to red for overcrowding or failure, yellow for congestion, and green for unblocked. Information on the number of cars, not only to red, yellow and green display car congestion level, supplemented by digital information released. The use of the station distribution and the facilities passenger capacity threshold setting system of passenger warning value, when reached the warning condition when the electronic display boards scroll limiting information, and show the real-time evacuation channel traffic situation, combined with the broadcast system on the passenger line guide,

reasonable distribution of passenger flow. The traffic information releasing function includes the automatic publication and the artificial release of traffic information. Traffic information automatic release is the traffic state of the road section which is directly released by the guidance screen and processed by the fusion processing algorithm. Automatic publishing includes several main functions, including the organization of information, the release of information and the publication of text information. The function of artificial publishing of traffic information is to give guidance information at the same time without stopping the background algorithm, and to increase the display information or temporarily replace the display information. The priority of traffic information artificial publication is generally higher than that of traffic information automatic publication, but the artificial publication information has its priority differentiation according to its type.

4. CONCLUSIONS

At present, big data mining technology has been widely used in various fields of social life. The guidance system is applied in the future traffic control as an important work model based on big data mining. Through this model, we are more diversified and efficient in traffic control and management. The means of diversification are more efficient in collecting and arranging information.

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