Intelligent Transportation Decision Analysis System Based on Big Data Mining

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Abstract. In the big data era, the intelligent transportation field also has begun to use big data technology to mine and analyze the massive traffic data, from which to extract valuable data information, for people to travel to provide convenience and for the relevant traffic decisions to provide an important basis. This paper mainly describes the intelligent transportation and big data mining, and analyzes the application of big data and data mining technology in intelligent transportation decision analysis system, which provides a new way to improve traffic congestion and relieve traffic pressure in big data era.

1. Introduction
Big data is rich in data and full of content, combined with the unique output of big data, it makes the transmission of big data unrestricted by the region. In traditional public transport management, traffic management information exchange in different administrative regions is not smooth enough, and information loss often occurs, resulting in poor traffic management. The application of big data in intelligent transportation system can transmit different types of data, combined with data mining, it can maximize the utilization of data information, and has a positive impact on the efficiency and quality of traffic management. In addition, the database is combined to complete the classification of data information, and the index directory is generated to provide reference for the real-time traffic obstacles. The integration of city traffic data resources through the full range, based on the “big data acquisition and integration” planning, it can establish intelligent city traffic geographic information system and intelligent city traffic decision analysis system, then build big data traffic information resource center of intelligent city, so as to improve social management ability and public service levels.

2. Intelligent traffic and data mining
Intelligent transportation is the product of the continuous progress of urbanization. It is the inevitable result of the increasingly severe urban traffic problems and the shortage of land resources. With the continuous development of the city scale, the number of urban population and vehicle ownership has increased. Under this situation, the contradiction between the increasing traffic flow and the effective traffic land has been aggravated. Under the influence of various factors, city transportation infrastructure can not keep up with the pace of growth of the traffic flow, the more unable to meet the needs of people to travel smoothly, and the main purpose of establishing intelligent transportation decision system is to improve the city traffic management level by improving the rationality of traffic decision-making, alleviate the traffic pressure in the city, make full use of existing traffic resources to meet the needs of people to travel convenient and smooth. From the view of the practical application, traffic problems have been alleviated to a certain extent owing to the application of intelligent...
transportation decision system of the city. Then the mass traffic data for the information processing system has brought enormous pressure, so in the era of big data, it is a key issue on how to use big data technology for mass data mining analysis, how to make it better service for intelligent transportation system so as to serve the intelligent traffic better and promote the further improvement of the intelligent transportation service system.

Data mining is the use of scientific technology and methods to collect and process information, so as to mine valuable information from massive, fuzzy data information. In the information age, massive data brings great pressure to data processing. Data mining is the inevitable requirement of the era of large data. Data mining mainly includes 4 aspects, namely, classification analysis, correlation analysis, cluster analysis, time series analysis. Through the application of 4 kinds of analysis method, from massive data information to extract the effective information for the use of intelligent transportation service system, the system will provide advice and guidance for traffic flow adjustment and people to travel.

The intelligent transportation system platform architecture is shown in Figure 1.

The establishment of intelligent transportation decision system is to monitor and manage urban road condition information and vehicle condition better, so as to meet the needs of people's convenient and smooth travel. The architecture of intelligent transportation is divided into three layers.

- Information layer.

The main function of information layer is information collection. The location information and traffic information of vehicle are collected in real time through the satellite location terminal, and transported to intelligent traffic cloud server through 4G network. The mobile terminal network transmits the related information of the residents' personal mobile terminals to the intelligent traffic cloud server. Cloud platform runs through the multi base station location algorithm to simulate and calculate the specific location and route of the vehicle or individual. City traffic can set the camera on regional traffic information real-time monitoring and collection, take the video stream through the encoding process using a wired or wireless network cloud service platform for data transmission, storage, distribution and management by the cloud service platform. Residents can also use mobile phones and other personal mobile terminals to upload GPS information.
• Network communication layer
  Its main function is to transmit data through cable, WLAN network and 2G/4G network will end data information of high-speed and reliable cloud service transfer platform.
• Cloud service layer
  It is mainly responsible for converting, analyzing, and storing data encode, forecasting traffic congestion time and degree of congestion, especially on the crowded road and Central Business District, to provide traffic prediction, path optimization, real-time bus information query service for user traffic.

3. Big data mining analysis scheme
Intelligent transportation decision system is built on the basis of big data analysis model of urban traffic road. In the daily traffic section, an ID tag is allocated at every distance of the city as a segmentation free logo, so as to build up the tag library of the whole city road. The location and running path of the motor vehicle on the road will be collected in real time, and the location of the vehicle's geographic coordinates will be shown on the corresponding roads. Through the Map Reduce framework, the system can quickly calculate the traffic flow on each section. Then it can determine whether the section is smooth and whether there is traffic congestion. So, it provides a strong reference for traffic scheduling and recommends the best path for users. On intelligent transportation platform, the route of each car will be recorded at any time. The general route is divided into multiple sections, and there will be a number of accessible routes from the beginning to the end. Using FP-Growth correlation algorithm for large data, through the establishment of FP tree, mining and analyzing big data, according to the congestion coefficient of each section recorded by the system, decision system can also recommend optimal routes for users while making convenient traffic decisions, so as to save users' travel time.

4. Management and control of intelligent traffic decision system
4.1 Management module of intelligent traffic decision system
• Static management:
  The key is to find problems based on the results of previous data analysis in transportation system, and excavate potential rules based on their results, so as to infer the development rules of transportation system, and then adjust and improve the traffic system. It includes the construction planning of urban parking lots and roads, as well as road usage restrictions, such as the arrangement of public vehicle lines and the layout of platforms along one way when driving.
• Dynamic management:
  The management system is used as a commanding officer to monitor the operation of all transportation systems. According to the real-time data displayed by data acquisition components, decisions are made at any time. For a place where there is a poor operation and need to be adjusted, it will give the control system a coordination instruction.
• Disaster management:
  It is traffic management strategy and emergency measures taken for sudden disasters, such as traffic grooming when there are major natural disasters such as water, fire and snowstorm.

4.2 Control module in intelligent transportation system
The main purpose of control system is to make the controlled object be in the best state of operation under certain conditions. For example, in the traffic light control system, the control system can control traffic flow at the intersection, including the cycle length, the green light signal and the phase difference between the intersections, so as to ensure the smooth traffic volume in the road network. In addition, if the system detects large traffic flow and congestion at the intersection, the system can send the blocking information to the driver through radio or electronic display panel, so as to induce traffic flow and relieve congestion at the intersection.
4.3 Application of artificial intelligence in traffic control

In the intelligent transportation system, the dynamic traffic can be allocated according to the real-time traffic flow information at the intersection, which provides the best driving route for the driver, and the prediction of traffic volume is an important mitigation for traffic control. At present, traffic flow forecasting methods have three versions: one is a historical data method, namely using historical data and combining the measured data of current traffic flow to establish the corresponding prediction model; two is a time series method, which is to predict the future traffic based on understanding the past a certain time of traffic flow; three is a neural network simulation method, namely using neural network to simulate some uncertain, complex, and nonlinear process characteristics, by combining with current measured flow rate, historical flow average speed, environment condition, etc. as input. At the same time, the BP neural network is used to predict the flow rate at a certain time in the future. Compared with the historical data method and time series method, it has no time delay, especially in the prediction of peak flow rate.

![Figure 2. neural network control model for flow prediction](image)

5. Conclusion

In summary, in the intelligence transportation system, big data mining technology can be used to extract, analyze and deal with the urban traffic information data efficiently and quickly. This can not only provide a powerful reference for the decision making of urban traffic management, but also provide convenient service for urban residents. It has important practical significance for improving urban transport infrastructure, promoting urban economic development and speeding up the improvement of information system. The urban traffic service department should attach importance to the application of the technology.

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