

Application Strategy of Big Data Processing Technology in Intelligent Transportation

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Abstract: With the rapid development of China's society and economy, the process of urbanization has been accelerated, and the transportation system has become more complicated, especially the frequent occurrence of traffic accidents, traffic congestions, and environmental pollution. In the context of the rapid development of Internet technology, digital technology, artificial intelligence technology, etc. We apply them to traffic management as effective ways to improve China's traffic operation management. Based on big data processing technology, this paper discusses its application strategy in intelligent transportation, in hope of serving as a reference.

Keywords: Big data; Processing technology; Intelligent transportation

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1 Introduction

The so-called intelligent transportation technology is intended to yield its ideal effect in traffic management, and it needs the support of a large amount of collected and aggregated data. At this stage, our society is gradually moving into the era of big data, and the collection and sorting of traffic data is more reliable and accurate. With the help of big data processing technology for traffic data processing, storage, display and sharing, it will give full play to the high efficiency, visualizability and other advantages of big data technology, explore the application strategy of big data technology in traffic operation management, promote the

implementation of emerging technologies in the field of transportation, and improve the standard of traffic management technology.

2 Overview of Related Theories

2.1 Big Data Processing Technology

The big data described in this paper is based on the aspects of data volume, which has the characteristics of large storage capacity, rich varieties, and fast processing etc. The comparison of traffic big data with traditional traffic data has the following characteristics: Firstly, traffic big data has a large amount of information and a wide range of sources, which can reflect its good long-term and extensiveness in the process of data storage; Secondly, the data processing speed is fast, and the traffic conditions control has a strong timeliness, and the current high-precision data processing technology is required in data processing; thirdly, in terms of the nature of the traffic data itself, it has the characteristics of very strong spatiality and practicalness. Therefore, the data generated later has certain practicality and significance of reference; fourth, the active application of the current relatively advanced computer, sensing and other science and technology can quickly realize the application and improvement of intelligent transportation technology.

2.2 Intelligent Transportation

Simply speaking, intelligent transportation is the use of current advanced automated control, electronic sensing, computer and other technologies to manage traffic information. Compared with the traditional traffic technology in the past, it takes big data processing technology as the foundation to

promote the refinement of intelligent transportation hardware, actively apply current advanced science and technology to give full play to its advantages in transportation, so as to build various operation modes such as data collection, data analysis and data feedback specifically for the transportation system. It has the functions of monitoring and predicting dynamic traffic data, which further improves the application efficiency of traffic data, and at the same time promotes the entire transportation system to yield better operating efficiency. In addition, through the use of current advanced high-tech and related machinery and equipment, it can quickly transmit and process a large amount of data information, use traffic big data to build a safety model, analyze and evaluate the safety of transportation systems, and improve the safety of transportation operations.

3 Big Data Processing Technology in Intelligent Transportation

In intelligent transportation, the application logic of big data is mainly embodied in the three stages of data collection, processing and application. The data flow logic is shown in Figure 1.

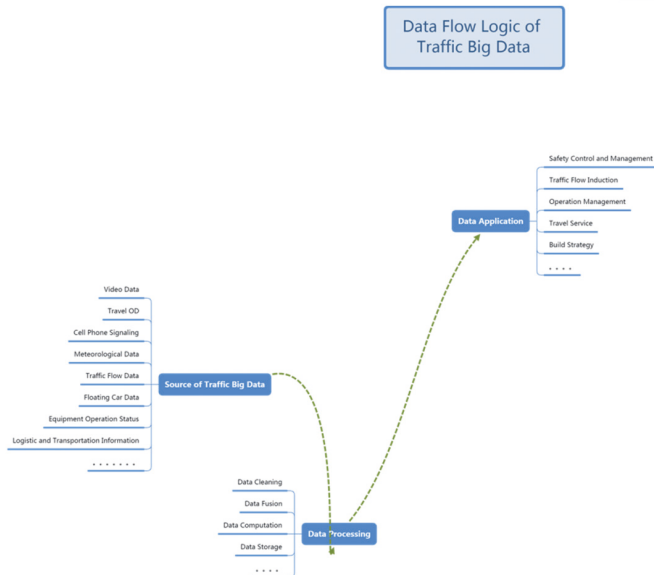


Figure 1. Big Data Processing Technology in Intelligent Transportation.

Below we will focus on introducing data collection, data processing, data analysis, and data sharing in our data logic.

3.1 Data Collection

Applying big data processing technology to intelligent transportation, information collection is mainly done

through multi-dimensional and multi-source data, mainly including the self-built data collection system of the transportation system and the shared data collection of other industries in the society. The self-built system mainly includes vehicle flow speed, time, video, OD and other parameter information collected by sensors such as induction coils, microwave radars, and video image acquisition equipment^[1]; the data shared by other industries in the society is mainly influential data for transportation operational control, such as meteorological data collected by meteorological units, mobile phone signaling data collected by communication operators, and logistics information collected by transportation companies. In the construction of intelligent transportation systems, various data affecting traffic operation and management should be fully collected to provide data support for traffic management and control strategies.

3.2 Data Processing

Data processing in intelligent transportation can be roughly divided into data cleaning, data fusion, data computation, and data storage, etc. Its biggest feature is that it can implement distributed or centralized data processing according to the source of the data and the management and control objectives of the platform and process irregular data and information by adopting intelligent and standardized cleaning and storage. For example, through the cleaning and fusion of road junction video data, radar data, geomagnetic data, and data such as floating cars on road segments, traffic signal timing and traffic accident detection etc. are carried out. It can also use the fusion processing of historical traffic data and real-time data for the prediction of traffic conditions.

3.3 Data Analysis

Traffic data analysis is to study the collected and processed data with appropriate statistical analysis methods, extract information closely related to traffic control, and display the degree of impact of various data on traffic in visual forms such as tables and graphs. In this way, the current traffic state, accident information, traffic operation and maintenance requirements, traffic control strategies, etc. of the traffic section can be analyzed; data mining technology can also be used to specifically analyze the data information in a certain traffic section in combination with current advanced AI, neural network and other technologies to judge the future

traffic conditions.

3.4 Data Sharing

Big data processing technology is the foundation of intelligent transportation system, which can realize the data sharing function between it and other systems, and further enhance the value of transportation data and the scope of data services. During data collection and analysis, the system will call the corresponding processing port according to the data request, service type and other requirements of related users, carry out data analysis and processing, transmit the processed data to each application system to satisfy the data application requirements of different users, complete data sharing, and effectively ensure the practicability of data.

4 Application Strategy of Big Data Processing Technology in Intelligent Transportation

4.1 Application in Traffic Safety and Smooth Flow control

Through the use of big data processing technology, it can effectively collect health status information of traffic infrastructure, information of traffic flow conditions, drivers' driving habits, and traffic accident information, etc. to formulate corresponding emergency plans for accidents, bad driving behaviors, and various traffic accidents, etc. based on collected and analyzed data, and at the same time improve the standardization of driving behaviors of drivers and passengers through safety warning and traffic control and management strategies^[2]. For example, under the state of traffic jam, using real-time collected traffic flow data, historical periodic traffic data, and surrounding road network traffic flow data to conduct traffic guidance in advance can improve the smooth flow of roads; under the state of accident, through the detection of accident information, timely release of early warning on accident information, and control and give early warning to upstream vehicles can reduce the human and financial losses caused by accidents.

4.2 Traffic Operation and Maintenance Management Application

In traffic operation, the specific analysis on traffic passage construction planning, road section traffic operation methods, management and control

strategies, etc., based on road network traffic volume data, OD data, regional economic and industrial distribution data in traffic big data, etc., provides executable, high cost-performance ratio operation strategies for traffic operations. At the same time, based on the data fusion of service time, life cycle, equipment health status and other data of various facilities in the transportation operation process, a reasonable and reliable maintenance plan is formulated for each facility in the transportation system, and the input and output of the transportation operation are compared and analyzed to provide data support.

4.3 Convenient Mass Travel Information Service Application

The convenient travel information service for the masses in the transportation system is realized by relying on the information sensor network. On the whole, the position sensing equipment of vehicles, stations, and parking lots etc. in the transportation system can provide effective information for the transportation service centers. In addition, combined with the current advanced cloud computing, data mining and other technologies, it can provide the traffic information that the transportation department needs anytime, anywhere, so that people can choose their own travel mode according to the actual traffic conditions when traveling, and avoid the disruptions caused by unplanned travel^[3]. From the aspects of the traffic information service system, it can provide timely and accurate information about relevant traffic sections, effectively avoiding problems such as uneven traffic flow and poor travel experience etc. For example, after the data collection and data fusion of GPS information, floating car information, and road traffic status etc, the navigation system provided by map operators for drivers and passengers will bring a good experience to travelers selecting travel modes and travel routes.

5 Conclusions

In conclusion, applying big data processing technology to transportation is the only way for the transportation industry to develop under the background of high-tech development. Through in-depth research and mining of traffic big data, more and more application demands and scenarios are bound to emerge in the transportation industry, and

the so-called intelligent transportation must also be implemented along the application of various emerging technologies. Research units and personnel in the transportation industry should increase the exploration of big data in the transportation field, and study in-depth the application of big data technology in intelligent transportation to meet people's needs for safety, convenience, and comfort in transportation systems.

Reference

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