

# Research on Intelligent Transportation System Based on Big Data

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**Abstract:** With the rapid expansion of domestic cities, urban traffic has become relatively more tense. In this context, urban traffic jams and traffic accidents occur more frequently, which is not conducive to people's daily travel. In the process of continuous development of cities, the application of big data technology in urban intelligent transportation systems is increasing, which has become the focus of current research. To this end, this paper first analyzes the current development status of intelligent transportation systems, further discusses the difficulties faced by urban transportation systems under the environment of big data, and finally gives three aspects of design and application ideas, so as to provide a little relief for urban traffic congestion and reduce traffic accidents. Reference.

## 1. Introduction

With the continuous improvement of people's living standards, the city's car ownership shows a rapid growth trend. The subsequent traffic jams and traffic accidents put a lot of pressure on urban road traffic. In the era of big data, how to use the Internet of Things technology to quickly analyze the current traffic data, use the analysis results and improve urban traffic efficiency is the focus of current research. Generally, big data provides multiple sources, large quantities, and accurate judgments for urban road traffic data, thereby providing solid technical conditions for building urban intelligent transportation systems. However, in the process of building an urban intelligent transportation system, there are still many problems, such as the structural design is not reasonable enough, the data analysis is still not clear enough, and the practicability is low. In response to this, it is hoped that by optimizing the design of the urban intelligent transportation system under the big data technology, it is possible to efficiently process massive multi-source urban traffic data.

## 2. Development Status of Intelligent Transportation System

In recent years, there have been increasing cases of intelligent transportation construction in cities around the world. Based on urban infrastructure and living facilities, various new technologies have been widely used and developed. Moreover, these technologies have simultaneously covered many fields such as intelligent parking, intelligent street lights, and intelligent transportation, and have become the focus of current research. First, the intelligent parking system has greatly improved transportation efficiency. At this stage, traffic congestion has become a key problem faced by urban transportation. In particular, cars are constantly looking for parking spaces on urban streets, which seriously increases the emission of carbon dioxide and other exhaust gases. With the development of smart parking technology, this problem will be reintegrated. Smart parking technology connects GPS data of mobile phones with parking sensors to provide real-time parking locations and information to nearby car owners, making the parking process easier. And, with this technology, urban traffic conditions have been greatly improved. In specific applications, foreign developed countries have introduced smart parking technology. Drivers can obtain real-time information of nearby parking spaces by dialing a special phone or a fixed App, and change the charging standard according to demand. Secondly, smart street lights make urban traffic faster. Under the condition of Internet of Things technology, street lights can become a key component of an intelligent transportation system. Generally speaking, street lights collect traffic information of urban streets in real time through sensors, and provide traffic data for managers,

making urban traffic management safer and more efficient. At the same time, smart street lights improve the safety of traffic fortresses during urban traffic. In the specific structure, intelligent street lamps use energy-saving LED bulbs, and automatically control the system through a wireless connection. When vehicles and pedestrians approach the street lights, they automatically start the motion sensor to illuminate the pedestrians of the vehicles. When the vehicle or pedestrian leaves, the light bulb will automatically turn off. In this way, urban traffic routes will be made safer. Third, intelligent transportation can effectively improve traffic safety. In the existing situation, the intelligent transportation system already includes all facilities such as signal lights and self-driving cars. The system will analyze the current traffic operation situation through sensors, and use big data analysis technology to provide information for managers to minimize traffic congestion and improve traffic safety. In many cities around the world, intelligent transportation systems have been widely used. For example, the sensor being used connects the camera to the traffic lights to ensure the safety of pedestrians. Boston and the cooperative company launched a smart street project, adding a data collection system to traffic jam intersections, and analyzing traffic data with the help of various sensors, so as to adjust the time of road signal lights in time and improve pedestrian safety.

### **3. The Dilemma Faced by the Urban Transportation System under the Environment of Big Data**

Under the current circumstances, urban road information is relatively complex and belongs to multiple departments such as transportation, public security, and civil aviation. These departments control a large amount of urban traffic information, but due to their own interests and the lack of information communication and coordination, it is more difficult to share urban traffic information. In this case, the difficulty of sharing urban traffic data and the inconsistency of data format standards make urban traffic information sharing and mining in a dilemma. As a result, the breadth and depth of the integration of urban traffic information resources still need to be upgraded. In addition, in the existing information sharing organizations, data sharing has not yet become a concept commonly recognized by people. Under this situation, urban traffic information sharing awareness has not been formed. Therefore, the sharing of urban traffic information data is always in the initial stage of development, and no awareness of sharing has been formed, which leads to greater difficulties in analyzing urban intelligent traffic data.

Under the environment of big data, the amount of urban traffic information is increasing, and it is characterized by multiple sources and multiple structures. To integrate these complex traffic information together and share it with the traffic management department, it is necessary to establish a perfect information collection and release platform. At the current stage of development, the development of urban traffic information and publishing platforms is lagging behind, and it is impossible to develop high-level service content. Therefore, it is difficult for many institutions to use the existing traffic information resources to provide diversified information services for relevant management institutions. For example, real-time road conditions, traffic jams, weather content, etc. At the same time, the high-level transportation information industry link is not perfect, and an integrated information sharing industry chain has not been formed. Therefore, the information collection, development and consumer market mechanism of urban intelligent transportation under big data has not been formed. There is still a lack of sufficient intelligent transportation industry chain between relevant operators, governments, suppliers and consumers.

Big data technology can analyze the content in detail, so as to judge the authenticity of the content. However, it should be noted that urban traffic information involves multiple levels of privacy and is highly confidential. Under the existing technical conditions, it is difficult to protect the security and privacy of resident personal and corporate data through technical means. Therefore, how to ensure the safety of traffic data is still an important content of current research. In this process, the government needs to strengthen the supervision of data security to protect the privacy of relevant departments and individuals from infringement.

#### **4. Measures to Improve the Intelligent Transportation System**

In the context of big data, intelligent transportation systems require massive and multi-source data support, so the update and research and development of data collection equipment has become a condition restricting its development. At present, the construction of intelligent transportation hardware in most cities is not yet perfect. The real-time acquisition of vehicle status, intelligent perception of the environment and vehicle-road information interaction technology need to be improved. To form an intelligent monitoring of the entire road network, construction investment must be increased and established the traffic data detection system provides a basis for the analysis of big data.

The transportation system is a complex and open large system. It is necessary to systematize the mechanism, data and knowledge to build a more accurate transportation system model. The emergence of big data, especially the organic integration of multi-source traffic big data, has laid the foundation for traffic modeling and also provided support for the improvement of traffic models. With a more complete traffic system model, the intelligent and integrated traffic control system can be realized in the future.

Starting from the increasing demand for traffic management, we will accelerate the technological innovation of the intelligent transportation industry, join relevant companies and scientific research institutions, and gradually improve the intelligent transportation technology innovation system, turn scientific research results into practical applications in a timely manner, and actively carry out international cooperation through Use international advanced experience for reference to improve the level of domestic transportation intelligence.

#### **5. Development Trend of Intelligent Transportation System Based on Big Data of Internet of Vehicles**

First, the integrated development of Internet of Vehicles and autonomous driving technology. With the continuous development of artificial intelligence, autonomous driving technology has gradually matured and began to be piloted in more and more countries, and car networking technology is undoubtedly one of the important driving forces for the successful development of autonomous driving technology. IoV technology can obtain and analyze data through sensors to provide external driving environment analysis such as workshop distance and speed judgment, road planning and road emergency handling, and vehicle accidents are responsible for judging a series of technical support. The most critical problem-the security problem provides a solution. Deep integration of car networking and autonomous driving technology and common development will be the only way for the successful implementation of autonomous driving technology.

Second, the diversified and coordinated development of the Internet of Vehicles and other related industries. Connected car big data contains high-value data including a large number of drivers' driving behaviors and habits. Through the use and continuous improvement of existing connected car big data intelligent transportation systems, related industries can design many innovative products. For example, insurance companies can design UBI vehicle-based insurance based on driving behavior according to the Internet of Vehicles big data intelligent transportation system, to achieve personalized and accurate pricing of vehicle insurance. Advertising companies can locate drivers' consumption habits through data mining techniques and consumer behavior theories based on their driving habits, and recommend vehicle maintenance services, auxiliary products, and other products and services of interest to them. The diversified and coordinated development of intelligent transportation systems based on the Internet of Vehicles big data has not only realized the leap-forward development of multiple industries, but also created a large number of stable sources of funds for the system itself, injecting into the entire diversified collaborative development system with the system as the core Sustained momentum for healthy and stable development.

Third, the security and confidentiality of IoV big data continue to improve. With the continuous development of the big data industry, the security and confidentiality of big data have received

increasing attention. The EU's "General Data Protection Regulation" came into effect on May 25, 2018, which is a milestone in the data protection process. Data protection legislation will also receive increasing attention from governments including our government. As a system based on user big data, the intelligent transportation system based on big data of Internet of Vehicles is also constrained by data security compliance. In order to realize the continuous improvement of system security and confidentiality, it can be considered from two perspectives of technical means and operating procedures. From the technical means, we design a secure encryption process for each link in the process of data storage and transmission, and formulate a perfect data security and confidential transmission use specification from the operating procedures, which work together to fully protect the user's data privacy and data security.

## **6. Conclusion**

The emergence of Internet of Vehicles and the maturity of big data technology provide new ideas for the development of intelligent transportation systems. This study combines the Internet of Vehicles and big data analysis technology to innovatively design an intelligent transportation system based on Internet of Vehicles big data, and analyzes its development trend. It provides drivers, vehicles, roads and other different elements in the transportation system. Solution. With the continuous development of technology, the intelligent transportation system based on big data of Internet of Vehicles will play an increasingly important role on the road to achieve the goals of smart transportation, smart city and smart life.

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