

Application Research of Big Data Technology in Smart City Construction

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Abstract: As urbanization accelerates globally, smart city construction has gradually become an important strategy for national development. Big data technology, as one of the important tools in the current digital era, is of great significance to smart city construction. Big data technology can collect, process, and analyze various information resources in cities to achieve intelligent, digital, and networked urban management, thus improving the efficiency and level of urban management. Big data technology has important application value and practical significance in smart city construction.

Keywords: Big data technology; Smart city; Smart transportation; Smart environment; Smart energy.

Introduction

With the continuous increase in population and the accelerated urbanization, cities face many challenges such as traffic congestion, environmental pollution, and energy shortages. In order to solve these problems, smart city construction has emerged. This paper will explore the role and application measures of big data technology in smart city construction starting from the concept of big data technology, providing useful reference for the construction of smart cities.

I. Overview of Big Data Technology

Big data technology refers to the technology of processing and analyzing large-scale and complex data sets, which has the characteristics of high speed, high precision, high efficiency, and high value. The application scope of big data technology is wide, including data collection, storage, processing, and analysis. With the continuous development of the Internet, the Internet of Things, and other technologies, the amount of data continues to increase, and the types and structures of data are becoming more and more complex, and the application of big data technology is becoming more and more extensive.

II. The Important Role of Big Data Technology in Smart City Construction

1. Improve Urban Management Efficiency

With the continuous acceleration of urbanization, the scale of cities is constantly expanding, and the difficulty of urban management is increasing. Traditional urban management methods face many problems such as information asymmetry, low management efficiency, and low service levels. The application of big data technology can achieve intelligent, digital, and networked urban management to improve the efficiency and level of urban management. Big data technology can collect various information resources in the city. The city is an information-intensive place, containing a large amount of data and information, such as residents' behavior, traffic conditions, weather conditions, public services, etc. Big data technology can collect these information in real-time through various sensors and monitoring devices, forming a large amount of data resources. In addition, big data technology can process and analyze urban data resources. Through processing and analyzing data, big data technology can discover problems and hidden dangers in urban management, propose solutions and policy suggestions, and provide reference and support for urban managers.

2. Optimize Urban Services

In smart city construction, big data technology can not only improve urban management efficiency but also analyze the behavior and needs of urban residents to achieve more accurate and personalized public services. By analyzing the behavior and needs of urban residents, big data technology can optimize traffic and intelligent navigation by analyzing the travel behavior of urban residents. Urban traffic has always been a difficult point in urban management, and big data technology can optimize traffic flow and intelligent navigation by analyzing the travel needs and behavior of residents. By monitoring and analyzing traffic conditions in real-time, big data technology can provide the best travel plan, reduce congestion, reduce the accident rate, and improve the efficiency and comfort of residents' travel. Big data technology can achieve business intelligence and precision marketing by analyzing the consumption behavior of urban residents. The optimization of the urban business environment is crucial to the economic development of the city. Big data technology can achieve business intelligence and precision marketing by analyzing the consumption behavior of urban residents.

3. Improve Urban Traffic Condition

With the rapid development of urbanization, urban traffic problems are becoming more and more severe. Traffic congestion, traffic accidents, and other problems not only directly affect the quality of life of residents but also have a negative impact on the economic and social development of the city. In smart city construction, big data technology can predict and alleviate traffic congestion by analyzing and predicting traffic data, optimize urban traffic management, and improve urban traffic conditions. Big data technology can predict and alleviate traffic congestion by monitoring and analyzing traffic data in real-time. Urban traffic congestion is an important problem in urban management, and big data technology can predict and alleviate traffic congestion by analyzing urban traffic data. By monitoring

and analyzing traffic conditions in real-time, big data technology can provide the best travel plan, reduce congestion, ease traffic pressure, reduce the accident rate, and improve the efficiency and safety of urban traffic. In addition, big data technology can optimize urban traffic management by constructing and predicting traffic models. The optimization of urban traffic management is crucial to solving urban traffic problems and improving urban traffic conditions, and big data technology can improve the efficiency and level of urban traffic management by constructing traffic models and predicting urban traffic conditions. By analyzing urban traffic data and establishing traffic models, urban managers can formulate more scientific and reasonable traffic management plans, improve the traffic efficiency and safety of the city.

4.Enhance Urban Security Prevention

The application of big data technology in urban security has become an important part of smart city construction. Big data technology can analyze and mine security event data in the city to discover the rules and characteristics of security events and propose corresponding security warnings and response strategies based on these characteristics. In addition, big data technology can monitor and warn urban security events in a timely manner by analyzing and processing urban surveillance video data. For example, video surveillance systems commonly used in smart city construction can automatically analyze surveillance videos through artificial intelligence technology, identify abnormal events and behaviors such as fires, traffic accidents, and personnel gatherings, and take timely measures for processing.

5.Promote Urban Economic Development

The application of big data technology in the urban economy is also an important aspect of smart city construction. By analyzing and mining urban economic data, the current situation and trend of urban economic development can be understood, and the future direction of economic development can be predicted, thereby achieving intelligent and accurate urban economic development. Big data technology can understand the urban business hotspots and market demand by analyzing and mining urban business data, and improve the operational efficiency and management level of urban business. In addition, big data technology can optimize urban financial budgets and financial management, and achieve rapid economic development of the city through analysis and mining of urban financial data. For example, by analyzing and mining urban financial data, understanding the urban financial revenue and expenditure situation, and formulating more scientific and reasonable financial budget plans, the management efficiency of urban finance can be improved, and the economic development of the city can be promoted.

III. Application Measures of Big Data Technology in Smart City Construction

1.Building Big Data Platforms

In smart city construction, a big data platform is a crucial infrastructure that carries the storage, management, processing, and analysis of the entire city's data. A good big data platform can not only provide efficient data processing capabilities but also achieve data sharing, data fusion, data openness, and other functions, providing more accurate and scientific data support for urban management decision-making. To establish a reliable big data platform, multiple factors must be considered. First, data security and confidentiality must be ensured, including data storage, transmission, processing, and other aspects. The big data platform must have powerful data security and privacy protection mechanisms to prevent data leakage and malicious attacks. Second, the big data platform must have efficient data processing and analysis capabilities. This includes data collection, cleaning, storage, mining, and analysis, requiring advanced data technology and algorithms to achieve high-speed data processing and real-time data analysis. In addition, the big data platform also needs good scalability and scalability to cope with the continuous growth of urban data scale in the future. To achieve data sharing and data fusion, the big data platform requires standardized data formats and protocols so that data from different fields can communicate and merge with each other. At the same time, open data interfaces and data marketplaces need to be established to provide data access and data services for urban management departments, enterprises, and the public, promoting the application and innovation of urban data.

2.Developing Big Data Analysis Technology

Building a reliable, efficient, and secure big data platform is only the first step in smart city construction. It is more important to apply various big data analysis technologies to process and analyze data, providing accurate data support for urban management decision-making. For data in various fields of smart cities, collection, integration, storage, processing, analysis, and visualization need to be conducted through big data technology. This requires big data technology experts to conduct technical research and development, propose analysis methods and algorithms suitable for urban management, and develop corresponding software tools. In the transportation field, big data technology can be applied to traffic congestion analysis, traffic safety prediction, intelligent traffic control, etc. For example, mobile positioning data can be used to monitor and predict urban traffic congestion in real-time, achieving accurate traffic prediction and intelligent scheduling. In the security field, big data technology can be applied to predicting public safety incidents, urban security monitoring, etc. For example, social media, mobile communication data, and other big data sources can be used to analyze and predict urban security incidents, achieving intelligent and accurate urban security management. In the medical field, big data technology can be applied to health management, disease prevention, diagnosis, and treatment, etc. For example, electronic medical records, bioinformatics, remote sensing technology, and other data sources can be used to analyze and predict the health conditions of urban residents, achieving personalized and accurate health management.

3.Promoting Intelligent Perception Technology

Intelligent perception technology is one of the foundations of smart city construction. It can collect various information and data of a city in real-time, including but not limited to traffic flow, air quality, garbage disposal, and water resources. This data can be provided to city managers to help them better understand the city's situation and make more accurate and reasonable decisions, providing better services for city residents. In smart cities, intelligent perception technology is widely used. Environmental sensors installed in various parts of the city

can collect air quality and noise data, providing data support for environmental governance. Sensors installed on city trash cans and garbage trucks can collect garbage disposal data, providing support for city garbage management. Based on intelligent perception technology, big data technology and artificial intelligence technology can be further applied to data analysis and processing. For example, through the analysis and prediction of traffic flow data, more scientific and reasonable traffic management plans can be formulated, improving urban traffic efficiency. Through the analysis and prediction of air quality data, the effect of urban air quality management can be improved, ensuring the health of citizens, etc.

4.Strengthening Data Sharing and Openness

Data sharing and openness are key elements of smart city construction, which can improve the efficiency and level of urban management, promote the development of urban economy, and social progress. In smart city construction, governments and enterprises should take active measures to promote data sharing and openness, promoting digital and networked urban management. Governments and enterprises should strengthen awareness of data sharing and establish sound data management mechanisms. Governments should formulate relevant laws and regulations to strengthen data protection and supervision. Enterprises should establish data governance systems and clarify data ownership and usage rules. At the same time, governments and enterprises should encourage data innovation, support innovative enterprises and projects, and promote further development of smart city construction. Governments and enterprises should strengthen data security protection, safeguard data security and privacy. Governments should establish sound data security protection mechanisms to prevent data leakage and abuse. Enterprises should establish data protection and privacy protection mechanisms, safeguard the legitimate rights and interests of users.

Conclusion

As an important support for smart city construction, big data technology provides rich data resources for urban managers, provides more convenient and efficient public services for urban residents, and provides more accurate decision-making basis for urban economic development. Therefore, governments should continuously deepen the application of big data technology in smart city construction, improve its application level and effect, and promote smart city construction and sustainable development.

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