Research on Big Data Technology System of Smart City

Guangbo Sun[1], Juanjuan Zhang[2], Shuihong Li[2]

1. Guangzhou GCI Communication Planning and Design Institute Co., LTD., Guangzhou 510310, China.

2. Guangzhou GCI Science & Technology Co., Ltd. Guangzhou 510310, China.

Abstract: With the coming of the age of intelligence, the new information and communication technology represented by big data technology brings new perspectives and foundations to solve the traditional city problems. Based on the actual needs of urban smart development and urban governance, big data should be excavated and processed reasonably and effectively, and the supporting role of big data for urban development should be studied, and a more practical strategic development path has been proposed. Based on the research of the current smart big data technology system, this article analyzes facts, pinpoints difficulties, and proposes solutions to problems, and contributes to the modernization of the national governance system and governance capabilities.

Keywords: Smart City; Big Data Technology; Internet of Things; Date Mining

1. Introduction

Urban development is a dynamic process, at present, internet of Things, cloud computing, big data, the next generation of mobile communication technology, is becoming a major concern of social and economic development. Big data technology breaks the boundary of information wall, makes data flow freely, realizes the scientific deployment of urban physical facilities, and drives the reasonable and efficient flow of people, logistics, capital and technology flow, which has become the key to solve and promote the construction of smart city.

Therefore, it is urgent to establish a big data technology system oriented towards urban smart development to study system structure, components, Big data thinking is adopted to effectively solve the contradiction between urban development and environment, resources and space, and gradually build a new type of city that is satisfactory to the public, enterprises and the government.

2. Smart city status analysis

In the tide of urban smart development in full swing in China, we must clearly and calmly recognize that there are still some problems in the current urban smart development [3]

Hundreds of cities across the country have embarked on urban smart development, which inevitably leads to repeated investment and waste of resources, lack of practical effects, and serious risks of hollowing out of construction.

The problem of "data island" is very serious due to the disunity of data format and low degree of standardization, the lack of effective integration of data resources and real sharing.

Due to problems such as technology, standards and management mechanism among various systems, it is difficult to form a coordinated, interconnected and efficient operation as a whole, so that the effect of smart development is greatly reduced.

Urban smart development mainly relies on the government to promote it, and lacks a multi-party cooperation mechanism and platform to attract social capital.

3. The content of big data support system in smart city

Big data technical support system of smart city [4] fully collects massive structured and unstructured data generated in

urban operation and aggregates them into the urban unified data platform to form urban basic database and comprehensive database. It includ basic support system, application system, industrial system, index system and operation and maintenance guarantee system.

3.1 Big data basic support system of smart city

The basic support system mainly refers to the information infrastructure that can support the whole process of urban big data perception, transmission, integration, analysis and services, including the perception layer, network layer, data layer and platform layer. The architecture is shown in Figure 1.

Perception layer mainly realizes the comprehensive perception of people and things in the city, and provides services to the upper layer in the form of unified data channels, supporting the stitching together of the information "digital space" and the "physical space" of the real city. The network layer mainly support the data collected by the Internet of Things to be transmitted to the back end through the communication network. Data layer: it mainly refers to the public database, including four basic databases such as population basic database, corporate database, GIS spatial geographic information database, macroeconomic database, as well as the business database of each department. The platform layer mainly refers to the city big data service platform, which can provide cloud computing services, public information service and the analysis of large data processing services [6], support intelligence applications with basic database and department business data as its data sources, ultimately promote the service level of application and the coordinated ability by integrating and exchanging acquired data and information, as well as analyzing and exploring its value.
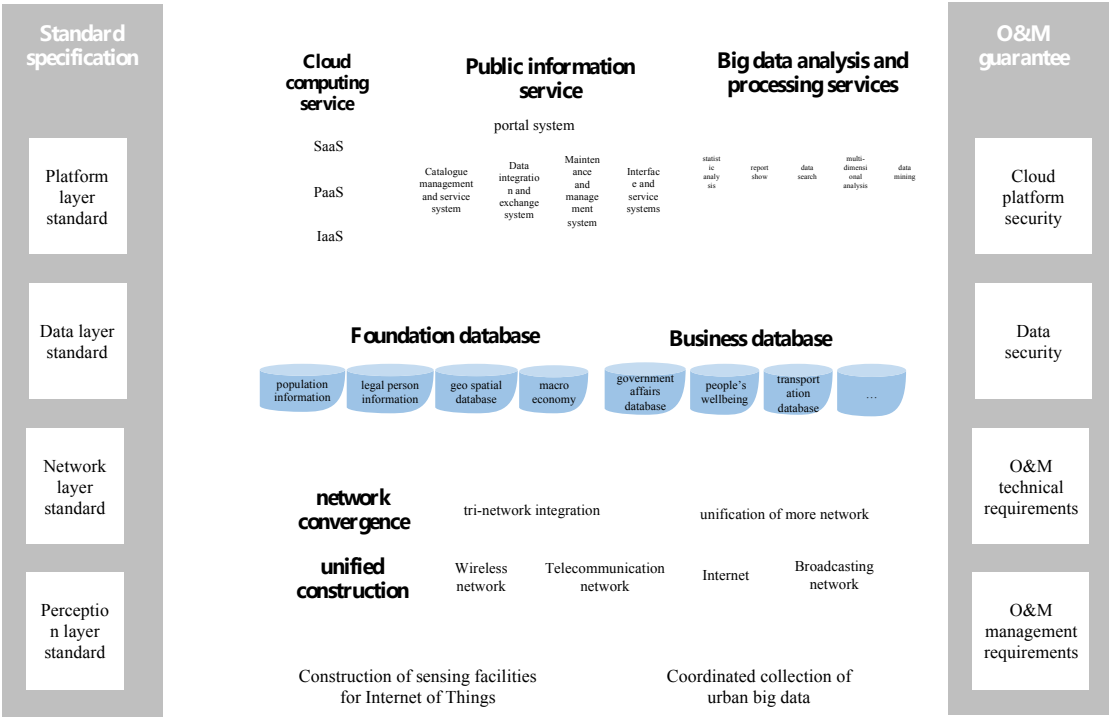

Figure1. The framework of smart city big data basic support system

3.2 The big data application system of smart city

The big data application system of smart city refers to a series of big data applications which make full use of the massive data generated and deposited in the operation of the city, on the basis of the urban big data support system, make extensive association, in-depth mining and smart analysis of the massive data by effectively integrating and sharing cross-departmental government data to extract the smart, regular and valuable information in the city, and form the ability to improve the urban decision-making assistance ability, insight and discovery ability and process optimization ability, including big data application of party and government management, urban services and big data application of livelihood. Among

them, big data application of party and government management includes big data applications of   one-stop administrative approval and public security, as well as big data applications of government affairs data opening, comprehensive governance of grassroots society, and population management；Big data applications for urban services and people's livelihood include big data applications of public facilities, transportation, health, urban management, safety supervision, food safety, citizen homepage, and digital life. Industrial big data applications include Internet, finance and securities, intelligent manufacturing, logistics, technological innovation, innovative design and power industry big data applications.

3.3 Big data industrial system of smart city

"Big data +" traditional industries: traditional industries such as clothing, equipment, home appliances, auto parts and other industries will generate new development models and new business forms by using big data. "Big data +" smart city industry: Some new models of "Big data +" smart city industry promoted by big data support the development of smart city, such as smart transportation industry and smart power grid industry.

3.4 Big data index system of smart city

Big data index system of smart city is based on all kinds of big data resources formed in the process of city operation, and establishes a set of relative numerical system to systematically describe various aspects of urban development. Index system for urban decision-making managers, producers and consumers three kinds of main body provides a structural framework platform [7] openly constructs index in several fields, leads urban planning, construction and development by index, and gathers more wisdom to achieve better urban governance, and solve urban development problems. Integrate the experience of city managers, experts in various fields and the public as well as all kinds of intelligence, data and multiple information, and use data mining, text mining model, expert opinion mining and other scientific and information-based methods to upgrade qualitative knowledge from various aspects to quantitative knowledge, and then obtains qualitative guidance for urban planning, construction and development from quantitative judgment [8].

3.5 Big data operation and maintenance system of smart city

Big data operation and maintenance system of smart city is a sum of elements which is to ensure that the operational subject to use operation and maintenance management platform and other operation and maintenance management tools to operate, maintain, overhaul and update the basic environment, network platform, hardware equipment, basic software, information system, data and security of urban big data service system according operation and maintenance standard, system and norms, realizing the safe and efficient operation of urban big data service system, including operation and maintenance organizations, mechanisms, platforms, talents, funds, standards, mode, etc.

4. Build a big data support system for smart cities

4.1 Main objectives

The strategic objectives of smart city development [9] are: through differentiated development, to build broadband with different characteristics in different cities and an ubiquitous, integrated and secure smart city information infrastructure and environment, and to form efficient, convenient and ubiquitous public information service system; to build a low-carbon, green and environmentally friendly livable city, and form a new engine for promoting smart city as a city for economic transformation and industrial upgrading; to achieve the goal of improving people's happiness of life, enterprise competitiveness and urban sustainable development ability, embodying the new concept and innovative spirit of urban development.

The corresponding strategic objectives of smart city's big data development are: to consolidate the information environment for smart city's big data development; to break the urban data island and build an urban big data ecological system integrating government, enterprise, public and market; to improve the legal guarantee and technical support system for the open sharing and comprehensive utilization of smart city big data construction; to use big data analysis technology to

promote high-level decision-making and high-level application, and promote the development of urban big data industry, support urban construction, government management and people's livelihood services; to ensure big data security in cities.

4.2 System construction

4.2.1 Construction of basic support system

Accelerate the construction of the public Internet of Things and the integration of the Internet, radio and television networks, to support more thorough perception and wider interconnection and trade; At the same time, improve the basic database and business database, establish the city public database, realize the city public data resources concentration and open; In addition, it will focus on the construction of urban big data service platform, providing public information services and big data analysis and processing services on the basis of cloud computing services, and realizing unified storage, real-time exchange and analysis and mining of data. Finally, the construction of standards and norms should be strengthened to ensure the orderly and standardized operation of each platform under the big data basic support system.

4.2.2 Application system construction

In accordance with the general thinking of "big platform, data gathering, strong association, deep mining, emphasis on application", establish a city-level cloud platform for big data integration and sharing, break the vertical administrative data management pattern of government departments [11], establish a unified basis for government data management service centers to effectively promote the effectiveness of data utilization, revitalize data resources, and deeply associate all relevant data, so that the management service information of all departments is superimposed and associated on the subject of the same identity code through the unified collection of most government departments government information. Accelerate the open government data, focus on big data key technologies and products, develop big data management services, thus effectively promote technical products, application model, business model and system mechanism of collaborative innovation, and vigorously promote original innovation and integrated innovation, form a complete innovation chain, and promote industrial development to the big data innovation-driven transformation.

4.2.3 Industrial system construction

Enterprises are the cells of industry, the huge amounts of data in the running process, such as "Internet +" enterprise, "Internet of Things +" products, fine management, knowledge network, product life-cycle management, customer relationship management, and product service, further promote the change of the enterprise, and is a process of gradual accumulation of big data and gradual transformation and upgrading of enterprises. At the service level, the services provided by government and third-party platforms not only effectively support enterprise transformation and upgrading, but also accumulate big data in the service process to promote the improvement of service level. Through big data, it helps to establish and manage various industrial alliances, make collaborative innovation in design, manufacturing and service, ensure collaborative quality and improve the strength of regional brands.

4.2.4 Index system construction

The index system reflects the needs of application objects and insists on practical orientation. Considering the degree and priority of different social subjects' demands for various indexes, as well as the interpretation methods of different social subjects, index system construction should reasonably determine which indexes to choose as key research objects and their short-term and long-term arrangements, so as to build open big data mining, analysis and index build platform, jump out of a single department closed circle, and shift the focus from business requirements of a single department into areas with the industry's overall development. From the current or recent "time-point" to the "period" of long-term development, a number of urban data indicators are integrated into the index, and the micro urban development data reflect the operation situation and development demand of the city macro and all walks of life.

4.2.5 The construction of operation and maintenance system

With big data basic support system, government service management application system, industry public service platform as the main operational objects, by optimizing the operational organizations, the construction of operation and maintenance system is to establish and improve operation and maintenance standards, processes and institutional norms, develop and build operation and maintenance management systems and special tools, strengthen personnel training and capital investment, adopt a variety of operation and maintenance modes, build an efficient and flexible operation and maintenance system, making the urban big data service system safe, reliable, usable and controllable.

Conclusion

Although every city has its own unique characteristics, the unique cultural characteristics of the city should be integrated into the process of smart city construction to reflect the characteristics of each place. But the basic function of the city big data infrastructure system is the same, so in order to promote the modernization of urban governance system and governance capacity, it is necessary to guide the formulation of design schemes based on the new generation of information technology to construct urban big data development system, analyze facts, identify difficulties and put forward solutions for intelligent development, and make strategic layout.

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About the author

Sun Guangbo, born in 1979, male, graduate student, senior engineer, majoring in government and enterprise informatization application and big data.

Zhang Juanjuan, born in 1991, female, undergraduate, intermediate engineer, majoring in the application of government informatization.

Li Shuihong, born in 1979, male, undergraduate, intermediate engineer, majoring in communication network, Internet of Things, network security.