Current Situation and Problems of Smart City Development in China Based on Big Data Analysis

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Abstract. With the steady progress of China's urbanization process, the smart city construction is also rising quietly. At the same time, the advent of the big data era has also provided new ideas for the construction and development of smart cities. In this paper, mainly the corresponding strategies for the construction and development of smart cities in the era of big data are proposed through the understanding of the features of smart cities and the positive role played by big data in the smart city construction.

Keywords: Big Data Era, Smart City, Construction, Development

1. Introduction

Nowadays, smart city construction has become a new trend in the development and construction of cities around the world. With the widespread application of computer network technology in people's daily work and life, big data plays a vital role in the establishment of smart city [1-2]. The smart city is the epitome of smart earth, which is also an essential measure for the USA, Europe and other developed countries to escape the economic crisis in recent years. Dubuque is the first smart city jointly built by the US government and IBM. Europe began the practice of building smart cities in the early 21st century. The prelude to the smart city construction began in 2000 with a smart card project in Southampton, UK. Countries such as the United Kingdom, Sweden, the Netherlands, and Denmark have also accelerated the strategic deployment of informatization development to enhance the comprehensive competitiveness of cities and solve the problems of urban development. The smart city construction has also achieved considerable results. In Asia, Japan launched the “i-Japan (Smart Japan) Strategy 2015”[3]. Singapore has become a global leader in the development of smart cities. In short, smart city construction has become an international trend [4]. With the increasing number of smart city pilot cities in China With the advent of the four overlapping historical changes of “industrialization, informatization, urbanization, and agricultural modernization” proposed by the 18th National Congress of the Communist Party of
China, China is busy building a smart city and triggered the upsurge of governments around the world to build smart cities. From a strategic perspective, to seize the historical opportunities of the “New Four Modernizations” and learn from the experience of industrialization and urbanization in the West, the smart city construction that we need to implement today is more complex, different, and phased than that in Western countries.

2. Big data analysis and smart city development analysis

For simplicity, this article sets up a big data collection:

$$S = \{(x_i, y_i), \ldots, (x_n, y_n)\} \in \mathbb{R}^n \times \{+1, -1\}$$  \hspace{1cm} (1)

$(x_i, y_i)$ are independent and identically distributed, the optimization problem of regularized dynamic functions can be expressed as

$$\min_{w \in \mathbb{R}^n} \Phi(w), \Phi(w) = r(w) + \frac{1}{n} \sum_{i=1}^{n} f_i(w)$$  \hspace{1cm} (2)

$w \in \mathbb{R}^n$, $r(w)$ represents a regularization term, a dynamic function $f_i(w)$ caused by data $x_i$.

It is assumed that the dynamic function is dynamic, the objective function $\Phi(w)$ has strong convexity. Many researchers have studied the solution of the optimization problem (2), among which the gradient descent method is the simplest first-order optimization method, that is,

$$w_{i+1} = w_i - \eta_i g(w_i)$$  \hspace{1cm} (3)

$g(w_i)$ represents the full gradient of all data objective function $\Phi(w)$ at $w_i$, $\eta_i$ represents the learning step.

Big data management can provide strong data support for the country, thereby helping the government to make favorable decisions. This is because the establishment of a big data database enables the government to intuitively control the objective information of city residents, environmental conditions, facilities, and transportation so that the government can formulate some policies according to the actual situation and the practical needs of citizens. In the policy formulation, especially in some emergency situations, big data plays a vital role in the development of smart cities. For example, when dealing with a fire emergency, the government can use the big data monitoring to find the best rescue path at the fastest speed and minimize the loss of life and property to the people caused by the fire. Secondly, big data information management can promote the economic development of cities. Nowadays, the Internet has become an efficient information communication tool in people's daily work and life. With the support of data networks, people can easily implement market economic activities.
such as consumer spending and electronic shopping in the city, which has promoted the prosperity of e-commerce. Finally, it can help residents improve their quality of life. Due to the convenience and speed of the Internet, citizens can quickly obtain the information they need through the network, thereby reducing the waste of residents' time. For example, when the ID card is expired, residents can check the government official website to confirm the place and time to apply for a permit, thereby avoiding the situation where the process is slow due to too many people and achieve the efficient application of resident ID cards, which is beneficial to the people.

3. Features of Smart City

Since the beginning of Britain's attempt to build a smart city in the 21st century, the world has quietly set off a wave of smart city construction. The United States, Sweden, Denmark, the Netherlands, and other countries have followed suit and made smart city construction attempts. Taken to our country. With the steady progress of the industrialization process, some cities in China have also tried to build smart cities and have achieved specific results. Hence, it is necessary to understand the features of smart cities.

3.1. High efficiency

In the modern management network established by the intelligent city, the government work can also make deep use of information technology to deal with the road traffic, livelihood protection, education, medical and health, ecological environment of the city quickly and efficiently.

3.2. Fusion

Among the three types of industries in the city, through the smart city construction, computers, commerce, and tourism can be fully integrated, thereby creating many new sectors. New industries, such as internet finance, e-commerce and intelligent tourism, based on the development of internet big data, will bring new impetus to the adjustment and transformation of social industrial structure, and will become a new motor of social economic prosperity.

3.3. Interactivity

Since human beings entered the history of civilization, all kinds of exchanges have always existed between people or between people and society, which is also the basis of the formation of society. Today, we have ushered in the city, the city is the symbol of social development civilization, is a more intensive society. center of. The smart city construction has enabled people and society to implement highly efficient and interactive interactions. The rise of wireless and mobile networks makes the use of big data more convenient, and the richness, inclusiveness and flexibility of smart cities are clearly revealed.

3.4. Openness

Because the city gathers half of our country's population, this makes the urban population extremely dense, and the population is highly mobile. In the smart city construction, citizens conduct social activities such as house leasing and job search through network platform exchanges to meet the needs
of citizens, which make the information of the intelligent city universal and the resources shared by the whole people.

4. Analysis of Existing Problems in China's Smart City Construction

According to the analysis of urban evaluation data in the 2016-2018 China Smart City Development Evaluation Report, as shown in Figure 3.1 In the past three years, the city of wisdom has shown a growing trend year by year. However, the level of development is still in the initial stage. There is great room to improve the overall level further. Among the six evaluation indicators, the construction of smart infrastructure, smart management, and smart services in a city has achieved significant results. Among them, the infrastructure construction in 2018 has doubled from 2017. At the same time, attention should be paid to the construction of the smart economy, smart population, and security system. For the construction of Nan'an District in a city in the above aspects, the specific phased analysis is as follows:

![Figure 1. Comparison of average scores of smart city development levels in a city from 2016 to 2018](image)

The overall thinking of China's smart city evaluation system is guided by relevant national policy research, and the connotative features of smart cities are proposed (as shown in Figure 2). The Eighteenth National Congress of the Communist Party of China has proposed the “five-in-one”, which requires the overall layout of the five-in-one to facilitate the coordination in all aspects of modernization construction, including political, economic, cultural, social, and ecological civilization. According to the “Guiding Opinions on Promoting the Healthy and Orderly Development of China's Smart Cities”, the construction of smart cities in China should focus on six aspects: infrastructure construction, social management, public services, industrial development, talent reserve, and urban planning.
5. Construction and development of smart cities in the era of big data

In traditional urban construction, when providing public services to citizens, they usually need to travel between multiple departments to apply for corresponding certificates. For example, a medical insurance card is required to seek medical treatment, a bus card is needed to take a bus, a library card is required to borrow books in a city library. Before citizens need to enjoy public services, they must spend a lot of time on the card application, which, however, is not necessary during the construction of smart cities in the big data era. Taking Hangzhou as an example, Hangzhou residents can enjoy public transportation (including subway, bus, ferry, and other public transportation trials) and Hangzhou City Civic Center borrowing books after applying for citizen cards with their ID cards and medical guarantees. Public bicycle riding, medical services at provincial and municipal hospitals, etc., which provides an integrated all-round service for citizens.

With the improvement of people's living standards, people's needs for the optimized living environment are also increasing, which brings new challenges to the smart city construction under the background of big data. For enterprises, due to the popularity of the Internet and electronic probes, government environmental supervision departments can monitor pollution sources in real-time, thereby alleviating the factory and environmental pollution effectively. On the other hand, for residents, due to the promotion of intelligent machinery in the context of big data, domestic pollution can also be controlled in a timely manner. For example, the Dutch government vigorously promotes energy-saving and environmental protection technologies and the application of clean energy in the work and life of urban residents, so as to achieve the recycling of resources, promote the reduction of waste, and enable the sustainable development of smart cities. For this purpose, 154 power interfaces are installed at Amsterdam's port terminals to charge freighters and cruise ships and replace fuel with electricity, thereby improving the quality of the urban environment. In addition, some cities in China, such as Zhengzhou, new types of wind combined with solar power are used to generate electricity from solar
energy during the day and from the wind on cloudy days to obtain clean energy in the construction of road lighting facilities. Through the energy-saving and environmental protection conversion of electric energy, autonomous lighting of street lamps at night is implemented.

In the context of the era of big data, the construction of transportation in smart cities is also particularly important. In current situation, due to the large population and high population density of China's cities, some large and medium-sized cities in China have extremely congested outbound traffic every time they reach the peak of work and holidays. With the development of data and information in smart cities, the interconnection in the process allows synchronized service of the real-time broadcast for traffic pavement conditions and networked services. Through the synchronous information data of the urban traffic network, people can choose the best route for traffic travel according to the congestion situation of road traffic. For example, Italy is actively advocating the development of urban green transportation, providing material rewards to residents who do not drive private cars and encouraging citizens to travel by public transportation means.

6. Conclusions

The era of big data has become the general background of social development, as one of the important role of smart city, is the future direction of urban construction, but also a beautiful society in the era of big data. Through the analysis and study of the features of smart cities and the positive role that big date plays in the smart city construction, the relevant suggestions for the construction and development of smart cities in the context of the big data era are proposed in this paper.

References

[1] Chen, L., Wang, Y., & Li, L. . (2015). [status of ethical awareness based on 88 medical journals in china and combined evaluation]. Zhong nan da xue xue bao. Yi xue ban = Journal of Central South University. Medical sciences, 40(9), 1029-1034.

[2] She, C., & University, P. . (2016). Analysis on the development status and countermeasures of the public platform of the library in the library of we chat. Journal of Educational Institute of Jilin Province, 47(6), 753–755.

[3] Pan, Y. (2016). Urban big data and the development of city intelligence. Engineering, 2(2), 171-178.

[4] Tang, B., Chen, Z., Hefferman, G. , Pei, S. , Wei, T. , & He, H. , et al. (2017). Incorporating intelligence in fog computing for big data analysis in smart cities. IEEE Transactions on Industrial Informatics, 13(5), 2140-2150.