Chapter 3
Core Technology of Smart Cities

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ABSTRACT

Modern cities are in an era of information fusion and knowledge explosion. With the rapid development of global information technology and the in-depth advancement of urbanization, urban informatization, especially smart city, will become the theme of urban development. The concept of smart city has many influences on the future development of the city. The application of the new generation of information technology will change the operation mode of the city, improve the management and service level of the city, trigger scientific and technological innovation and industrial development, and create a better city life. This chapter will introduce the core technologies to promote the development of smart cities, including big data, BIM, internet of things, cloud computing, and virtual reality technology, and on this basis introduce the typical industrial applications of various technologies.

1 INTRODUCTION

The essence of smart city is to use the new generation of information technology to realize the intelligent management and operation of the city, so as to create a better life for the people within it, and promote the harmonious and sustainable development of the city. Therefore, technology is the basis for the realization of urban intelligence.

In this chapter we will mainly introduce the supporting technologies needed for the construction of smart city, including big data, cloud computing, virtual reality, Internet of things, BIM, etc. By intro-

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ducing the characteristics, technical architecture and application of these technologies, we will have a deeper understanding to the role of these technologies in smart city.

2 BIG DATA

Since the new century, with the extensive growth and significant development of digital technology and network technology, the amount of data generated by human society has grown exponentially, doubling approximately every two years. It is expected that in 2020, the world will have a total of 35ZB of data, and humans will inevitably usher in an era of big data.

2.1 Concepts and Characteristics of Big Data

Big data refers to massive data with high growth rate and diversified data structures that need to be processed more efficiently. (Zhu et al.,2016). There are multiple definitions for big data, such as the following two:

The definition given by research institution Gartner is that Big data is a massive, high-growth and diversified information asset that needs new processing methods to gain stronger decision-making ability, insight and discovery ability and process optimization ability.

The definition given by the McKinsey Global Institute is A data set that is large enough to exceed the capabilities of traditional database software in terms of collection, acquisition, storage, management, and analysis.

Big data shows the characteristics of "4V + 1C", in which "4V" refers to Volume, Variety, Velocity and Value, "1C" refers to complexity (Osman,2019).

(1). Volume: Huge Amount of Data

Large volume is the most significant feature of big data that distinguishes traditional data. According to IDC, the volume of global data nearly doubles biennially; Over the last two years, people have produced as much data as those in the entire previous history of human race. While general relational database processes the data in terabytes, data processing in big data is usually above petabytes.

(2). Variety: Multiple Data Types

There are many data types of big data, including structured data, semi-structured data and unstructured data. Compared with structured data, which is mainly based on text, log, audio, video, pictures, unstructured data imposes additional requirements on data processing capacity.

(3). Velocity: Fast Data Flow

Fast processing speed is another significant feature that set big data apart from traditional ones. Only real-time analysis of massive data can reflect the value of big data. IDC's "digital universe" report predicts that the amount of data stored in electronic form worldwide will reach 35.2 ZB by 2020, and processing efficiency will be the key to measuring the level of technology in the face of such a huge amount of data.

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