

Original Research Article

Discussion on Remote Sensing Big Data to Promote the Development of Smart City

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Abstract: With the development and application of Internet technology, cloud computing, big data technology, Internet of things technology and other new generation information technology, smart city has gradually become the focus of global urban development. Remote sensing technology big data is the combination of remote sensing technology and big data technology. Remote sensing technology has the characteristics of long-distance, non-contact detection and wide coverage. And the data information collected by remote sensing equipment is analyzed by using big data technology to improve the application value of remote sensing technology. This paper first describes the characteristics of remote sensing big data and the connotation of smart city, and that the remote sensing big data technology can promote the intelligent supervision of urban pollution, urban planning, urban traffic intelligent response, and construction more reasonable and humanized, then it can help realize the development of urban traffic intelligent.

Keywords: Remote Sensing Big Data; Smart City; Urban Planning and Construction

1. Introduction

Smart city is the application integration of information technology and the important development direction of the new generation of information technology. In 2012, the Ministry of housing and urban rural development issued *The Interim Measures for the Administration of National Smart City Pilot*, and carried out pilot work in 90 cities nationwide. In 2013, the Ministry of science and technology and the National Standardization Administration Commission determined 20 pilot cities for smart city technology and standards, promoted the application of new technologies in smart cities, formed a smart city technology and standards

system with independent property rights in China, and promoted the development of smart cities in China. The application of remote sensing technology in the construction and development process of smart city can carry out normal monitoring for urban planning and construction, urban land use change, environmental pollution monitoring, crop production, etc., and provide support for application services of various departments of the city. In addition, it can also improve urban management and service level, and promote industrial structure upgrading and transformation^[1].

2. Characteristics of remote sensing big data and smart city

2.1 Characteristics of remote sensing big data

Remote sensing big data is the combination of remote sensing technology and big data. The remote sensing data obtained through various types of remote sensing data have the characteristics of big data, mainly measuring the massive remote sensing data information, and integrating other auxiliary information. Using big data technology and thinking, this kind of multi-source, multi-form, multi-band, multi-resolution mass remote sensing data information can be obtained valuable data information theory, method and technology. Remote sensing big data have the following characteristics:

2.1.1 Objectivity

Remote sensing technology is to collect and process the electromagnetic wave information radiated and reflected by a long-distance target through various sensing instruments, and draw it into an image. It is a comprehensive technology to identify and detect various real scenes such as ground structures and landform forms. The data information collected by remote sensing technology reflects the spatial form, physical characteristics and chemical characteristics of the target, which is not interfered by human factors and has good objectivity. For example, weather satellite cloud image broadcast by CCTV every day is measured by remote sensing technology to reflect the amount of water vapor in the atmosphere, the thickness of the cloud layer and the trajectory of the movement. Through these information, the spatial and temporal distribution of water vapor and precipitation can be estimated^[2].

2.1.2 Polyphyly

Remote sensing technology is composed of remote sensor, remote sensing platform, transmission equipment, receiving equipment and image processing equipment. Remote sensors include cameras, multispectral scanners, microwave radiometers or synthetic aperture radar. Remote sensing big data come from various sensing devices, and the imaging mode, resolution and electromagnetic spectrum of these sensing devices are also different. The multi-source of remote sensing data can help to analyze the natural features and human environment of remote sensing objects, provide reference for urban planning and construction, and provide support

for disaster treatment. In the 2008 Wenchuan earthquake rescue operation, China's aerospace remote sensing technology, aviation remote sensing technology and ground remote sensing technology are fully used to obtain remote sensing data of multiple systems, providing technical support for the search and rescue of people in the disaster area and the prevention of secondary disasters^[3].

2.1.3 High resolution

With the application of modern information technology such as GPS technology and GIS technology in the field of remote sensing, the spatial resolution, temporal resolution and spectral resolution of remote sensing data are getting higher and higher. In 2001, the spatial resolution acquired by the U.S. QuickBird satellite was 0.61 meters. In 2008, the spatial resolution of the U.S. launched GeoEye-1 satellite reached 0.41 meters. In 2014, the spatial resolution obtained by the U.S. satellite reached 0.31 meters. In 2017, the spatial resolution of the U.S. GeoEye-3 satellite reached 0.25 meters. At present, the resolution of the high-resolution earth observation satellite system implemented in China has reached the sub meter level.

2.1.4 Real time

In the process of remote sensing technology obtaining the data of the target object through the remote sensing platform and remote sensor, the sensor needs to continuously collect the data information of the target object and transmit it to the receiving device in real time through the transmission device, so that the receiver can obtain the remote sensing real-time data information^[4]. The real-time nature of remote sensing technology can be used for forest fire monitoring, recording the time, location, scope and fire situation of the fire, and analyzing the change of the fire in real time according to the monitored remote sensing data, so as to provide reference for fire fighting and prevention.

2.2 Smart city

Smart city combines the concept of information technology and innovation in all walks of life to realize the integration and connection of all kinds of urban systems, which are used to sense, monitor and manage the information of urban industry and commerce, public

security, people's livelihood, urban services and other aspects, so as to make intelligent response to all kinds of demands of the city, to meet the demand of urban intelligent management, promote the integrated development of urban informatization, industrialization and urbanization, optimize urban management and service, alleviate urban diseases, realize the demand of urban refined and dynamic management, and create better urban life for urban residents. Smart city includes smart infrastructure, smart people's livelihood, smart industry and smart Governance^[5]. Intelligent infrastructure refers to network infrastructure and public service platform, which can meet the needs of information transmission in the development of smart city; Smart people's livelihood is a measure to ensure people's livelihood, including medical treatment, transportation, education, management and other aspects; Smart industry is an important pillar to realize smart city. By using information technology, the upgrading and transformation of traditional industries can be promoted and the urban economic growth mode will be more intelligent and efficient; Smart governance refers to the use of information platform by the government to meet the needs of urban development and improve the administrative level of the government. For example, to achieve network office, enterprises can complete relevant formalities without going out.

3. Remote sensing big data promotes the development direction of smart city

3.1 Intelligent supervision of urban pollution through remote sensing big data

With the rapid development of urbanization and the continuous increase of urban population, the development of the construction industry is promoted. The construction industry is an industry with high energy consumption and high emissions. In the process of construction production, a large number of construction wastes and dusts are produced. These construction wastes have not been effectively treated and dustproof measures, which may cause environmental pollution and affect the air quality and life quality of the city. Therefore, it is necessary to carry out real-time monitoring of urban construction environment, computer information

technology, remote sensing technology, big data analysis and mining technology, Internet of things and other modern information technology, which can carry out real-time monitoring of the discharge, transportation, backfill treatment of urban construction waste, and realize intelligent management^[6]. At the same time, for urban construction waste collection and treatment sites, UAV remote sensing technology, GPS technology, sensing equipment and three-dimensional technology can be used to establish a sensing and monitoring system for urban construction waste treatment, which can conduct real-time dynamic monitoring of the form, water content, volume, emission of urban construction waste, and use big data technology to establish waste capacity prediction and overall planning, analyze and forewarn the dynamic process change of the surrounding fill slope. Once there is a tendency of landslide, the alarm information will be sent out immediately. Through the monitoring system of urban building waste treatment, it can provide scientific reference for the transportation and treatment of building waste such as urban management and Environmental Protection Bureau, provide technical support and decision-making for urban emergency command, and comprehensively improve the level of urban management.

3.2 Remote sensing big data promotes more reasonable urban planning and construction

With the rapid development of urbanization, the contradiction between urban population and land has become more and more prominent. The scale and quantity of urban population exceed the capacity of urban planning and design. Urban functional zoning is unreasonable, and the urban space is not scientific. Moreover the illegal use of urban land has become increasingly prominent. The traditional manual inspection method not only consumes a lot of manpower and material resources, but also can not cover all areas of the city, which is not conducive to the overall planning and development of the city. By using the functions of high resolution, high definition, massive data information and dynamic monitoring of remote sensing technology, massive data information can be collected, and high-resolution remote sensing technology can be used to analyze massive data information. The image

data collected by remote sensing monitoring system is extracted by computer intelligence, and the image information is automatically output. Through comparative analysis of the changes before and after the image, the spatial location, and the land type attributes, and in combination with the project data approved by the urban construction department, reasonable image information in the image can be eliminated. The illegal building graphics can be selected, and the suspected image information can be sent to the competent departments of each county and city for verification. Each county and city can quickly find out the illegal construction by screening the image information. Through the construction of urban construction monitoring system, the real-time monitoring of urban buildings can be carried out, providing a reference for the law enforcement of urban law enforcement departments^[7]. For a long time, China's urban landscape, traffic and road administration, commercial buildings and other types of planning lack of a unified platform, unable to achieve the communication and coordination of information, resulting in content conflicts, mutual isolation, and unreasonable urban planning and construction. Big data technology, through the integration of urban economic data, population, regional economy, health care, transportation, education and other data information, and the use of remote sensing technology, to build a three-dimensional model database of the city, establish a unified information platform, open all data information of urban planning and construction, and the public through open information, provide suggestions for urban planning and construction, and use the three-dimensional data model to show the effect map of urban planning and construction, find out the problems existing in urban planning and construction, and constantly optimize the urban planning and construction scheme, so that the urban planning and construction are more reasonable and humanized, and meet the needs of citizens.

3.3 Remote sensing big data helps smart city traffic

Urban traffic problem has become an important bottleneck of urban development. With the population growth, urban traffic congestion is becoming more and more serious. The application of remote

sensing big data technology in the field of smart city traffic, using the characteristics of all-weather, high-resolution and high-precision remote sensing technology, can carry out real-time monitoring of urban traffic, high-resolution radar impact. It can also timely identify the problems of road, bridge and other traffic facilities, and provide reference for traffic rescue and rapid investigation of traffic accidents^[8]. In case of geological disaster, emergency assessment can be carried out for the damage of traffic facilities, and effective measures can be taken to prevent the secondary disaster from happening again. At the same time, through the collection of massive traffic data information, comprehensive analysis of urban development scale, urban population, vehicle ownership and other data information, to provide a reference for urban road traffic planning, so as to make the construction of urban traffic society more reasonable and effectively solve urban traffic problems.

4. Conclusion

At present, there is no clear concept of smart city. At present, all parts of the country are actively exploring the construction technology standards of smart city. The application of remote sensing big data in the field of smart city can comprehensively collect the information of urban landforms, buildings, etc., provide effective reference for urban planning and design, environmental monitoring, traffic development, etc., and accelerate the development of smart city.

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