On Application of Geographic Information System in Urban Surveying and Mapping

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Abstract. With the continuous development of new technologies, geographic information system (GIS) has developed greatly in China, and a new pattern of national geographic information websites supplemented by provincial information management departments has gradually formed. However, there are still some shortcomings in its practice, such as lack of complete overall management in network construction, lack of practicality, serviceability, and convenience, and lack of the smooth operation of the guarantee mechanism. This paper mainly explores the characteristics of GIS and analyzes its practical application in urban surveying and mapping.

Keywords: GIS, Urban surveying and mapping

Introduction
With the rapid development of the times, the surveying and mapping of modern cities has also entered people's field of vision. As an important technology of surveying and mapping in modern cities, GIS has provided favorable data for the design and planning of modern cities, and it also brings great help to urban surveying and mapping.

1. Characteristics of GIS
GIS includes collection information, output information, analysis information, and management information, and it is also dynamic and spatial [1]. Its main goals are geographic decision-making and system research. Geographic models are used to achieve the goals. The unique spatial analysis capabilities of GIS are used to predict the dynamic information of the geography. At the same time, multiple factors are combined to comprehensively analyze the information to obtain higher-level geographic information. In addition, GIS can manage spatial geographic data with the help of computer information systems, and effectively analyze the information data. Computer programs can simulate conventional geographic information, explore its analysis methods, and use the analysis results as spatial data to produce more useful geographic information to complete tasks that cannot be done by human beings. Furthermore, GIS can be divided into two types of analysis methods, namely external analysis and internal analysis. External analysis refers to a software and hardware system of a computer, while internal analysis refers to the geospatial information model constructed by the
common function of computer applications and geographic data organization. It is a geographic system that can reduce system logic. In general, GIS solves the problem of information management by acquiring, collecting, managing, operating, and displaying geospatial information data [2]. GIS covers a wide range of industries and has become an important means of information collection and analysis in various fields.

2. Specific contents of the construction of surveying and mapping information system

The whole information management system can be divided into three basic categories according to different situations, including marine surveying and mapping information system, geodetic surveying information system and urban surveying and mapping information system, and these three basic categories reconcile and support each other. Among them, the marine surveying and mapping information system is composed of the situation of marine gravimetry data, the control network of marine surveying data, and the situation of marine bathymetry. At the same time, it can also analyze the thematic information of tide, ocean current and river in China [3]. Under the analysis and management of these data, we can monitor and navigate the relevant geographic information in real time. Geodetic information system mainly exists for the storage of basic geodetic data within the scope of national regulations, including the data stored in national geodetic control network and leveling network, and the existence of this system is to effectively manage the relevant data of result of geodetic information, and analyze these data to provide useful data to the outside world. The main function of urban surveying and mapping information system is to provide data for urban planning, government construction and other departments, and provide useful data for them in the process of urban construction. In addition, the data stored in the urban surveying and mapping information system is a large amount of data information base, which contains the urban population greening thematic map, land scale map, and remote sensing image map. Through the statistics, management and analysis of these data, it can provide powerful help in the spatial decision-making in the geospatial information [4].

3. Effective measures for management of surveying and mapping information system

3.1 Operation and management of database

In GIS, the operation and management of database includes three aspects, that is security protection, organization, storage of database, data management and data maintenance. (1) Security protection of database. The data information stored in the database is an important strategic resource in the information age, so it is important to protect and store the data information effectively. In the protection of database, DBMS mainly adopts such four operations as integrity control, concurrency control, security control and timely recovery of database, as well as protection functions of DBMS like system buffer management and data storage [5]. (2) Data organization, storage and management. DBMS needs to classify, organize and store the managed information data, such as user data, data dictionary, and access path. Through database analysis, we can find out that what kind of file structure these data exist in and how to organize the data, so as to realize the real connection of data. To improve the utilization of data storage space is the basic goal of data storage and organization, so the appropriate access method is helpful to improve the access efficiency. (3) Database maintenance. The work of database maintenance template includes the loading, reconstruction, storage and performance monitoring of data information, and these functions are implemented by a variety of programs in the actual work.

3.2 Staffing and system management mechanism

The operation of GIS requires a high professionalism to be completed in coordination. These staff need to provide favorable assistance in data exchange, information storage, and data management to ensure that the client can effectively access the data on the server after system verification [6]. In addition, data from different systems and regions can be shared and accessed, and a unified
management mechanism can be created, so that GIS can provide accurate information support for departments.

4. Application of GIS in urban surveying and mapping

4.1 Application in safety systems
Problems of security are prone to occur in the process of informationization, and problems of network are precisely the issues that need to be paid great attention to in problems of security. In the urban surveying and mapping, the data obtained through GIS are relatively accurate, so it is important to protect these data. Once the data is leaked, it will cause immeasurable trouble to the country and people. In order to effectively avoid data leakage, GIS should be improved during urban surveying and mapping to ensure data security. In addition, relevant departments should focus on the protection of data, and protect data information in an all-round way through digital authentication technology and digital encryption technology. And the measured data should be backed up to avoid irreparable consequences after data loss. Moreover, relevant departments should improve the data storage management system for data security. The well-preserved surveying and mapping data should only be viewed by professional technicians. In general, multiple factors should be considered to protect data security, which is an important measure in urban surveying and mapping.

4.2 Application in data processing
Professional computer software can effectively process related data information. In GIS, the main role of computer software is to analyze and model the collected data. It is not a general analysis of individual data, but a combination of the used data, a detailed analysis of the overall data, and an analysis of the empty digital data. In addition, the purpose of mapping is different, and the measured data are also different. Through the comparison and analysis of different data, the relationship between the data and the relationship between the data can be resolved, which is the core content of data processing by computer software. In the process of urban surveying and mapping, the surveying and mapping data is divided into raster data and vector data, which can be divided into many layers. In actual data processing, more specific levels are involved, rather than including all the data. Therefore, the use of computer software for data processing will improve the effect of data processing.

4.3 Application in data analysis
After data collection and processing, data analysis is carried out, while the data analysis of GIS is a comprehensive analysis, which belongs to spatial analysis. In the analysis of GIS, spatial analysis is an extremely important and complex analysis. Spatial analysis contains not only the relevant information of geography, but also the contents of sociology and regional science. In the process of data analysis, the knowledge of graph theory and topology will be used to accurately predict and analyze data information.

4.4 Virtual environment function of GIS
In the process of urban construction, some estimation and prediction can not be carried out in the entity, so the function of virtual environment is important in GIS. The use of virtual environment function can effectively improve work efficiency, and further carry out multi-dimensional analysis of data. In addition, in the urban construction, the virtual environment can be implemented in the actual surveying and mapping. Multiple spaces of the city can be simulated and evaluated at the same time by using GIS virtual technology in GIS, including environmental impact, military simulation, civilization reconstruction and regional construction. In addition to the use of virtual technology in urban surveying and mapping, the role of simulation and evaluation is still effective in the special environment such as Shangang. Through the use of a virtual environment, the natural phenomena in Shangang are completely simulated, including natural disasters such as earthquakes, fires, and droughts. By assessing the loss of natural disasters to the geographical environment, the occurrence of
natural disasters can be effectively prevented to ensure the safety of people's lives and property.

5. Conclusion
It is known from the above that the use of GIS can effectively reduce the workload of engineering survey and further improve the work efficiency occupying an important position in the development of engineering surveying and mapping technology. And the economic and social benefits it brings are considerable. Therefore, surveyors should strengthen the use of geographic information technology and apply it in urban construction to make our urban construction more standardized and scientific and further improve surveying and mapping technology of our country.

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