Application Research and Analysis of Geographic Information System in Intelligent City Surveying and Mapping

Xiaoli Shan*1, Yuanyuan Wang1, Mingyu Dong2, Jie Xia3
1Weifang Engineering Vocational College, Qingzhou, Shandong, China
2Qingzhou Natural Resources and Planning Bureau, Qingzhou, Shandong, China
3Sunjia Yangmeng Primary School, Hanting District, Weifang, Shandong, China

*Corresponding author: 873395925@qq.com

Abstract. With the rapid development of information, the development of geographic information system (GIS) is also very rapid, and the development of information has laid a solid foundation for geographic information. In the process of practical application, geographic information system has obvious advantages compared with traditional surveying and mapping technology, which can reduce the influencing factors of external environment and has strong anti-interference ability. Establishing and perfecting the information surveying and mapping system is of great significance to the healthy and orderly development of society. In the surveying and mapping of smart city, as a kind of pre construction scanning positioning system, GIS has high measurement accuracy and data processing ability, so it is paid more and more attention by construction enterprises and construction enterprises in urban construction. In this context, this paper discusses some functions of GIS, analyzes its application in Intelligent City Surveying and mapping, which makes GIS more widely used.

Keywords: GIS, Surveying and mapping, Urban construction, Smart city

1. Introduction
With the development of science and technology and the improvement of society, people not only have strict requirements for navigation systems, but also put forward high requirements for the improvement of geographic information systems [1]. With the continuous development and innovation of digital technology, graphics data processing has become more convenient, and the relationship between geographic coordinates in graphics can be displayed more vividly and intuitively. Geographical information systems include detailed analysis of terrain data, kilometers from standard tasks, precise location, time taken to reach, and precise location [2]. In the process of smart city surveying and mapping, geographic information systems (GIS) can accurately reflect the spatial location and shape characteristics of things, which can promote the better development of urban construction in my country and accelerate the overall process of urban modernization in my country [3]. Geographical information system not only provides people with geographic location navigation and geographic information introduction, but also plays a considerable role in urban planning [4]. In the process of practical application, geographic information system has obvious advantages compared...
with traditional surveying and mapping technology. It can reduce the influence factors of external environment factors and has strong anti-interference ability. In urban surveying and mapping, through the application of geographic information system, geographic coordinates and information can be organically integrated to obtain effective digital images, provide reliable data basis for subsequent engineering construction and urban planning and construction, and formulate scientific and reasonable construction plans [5].

Under the conditions of rapid development of science and technology in China, geographic information systems are developing rapidly. In the process of development, positioning systems and Internet technologies are used to make geographic information systems widely used in cities [6]. It provides a spatial information system for data related to geographic distribution. The specific process can be seen as a continuous operation of data collection, storage, management and analysis of information on the earth's surface and spatial geography. The formation of an informatized surveying and mapping system is of great significance in the field of urban surveying and mapping development. It is the fundamental guarantee for urban construction. The establishment of a sound informatized surveying and mapping system has important guarantees for the healthy and orderly development of society [7]. The extensive promotion and application of geographic information system in our country, in addition to urban surveying and mapping, has also achieved considerable results in disaster prevention, weather forecasting and traffic management. Strengthening its research will promote urban construction and development. Role [8]. In today's information society, GIS has advantages based on its own characteristics. This article discusses some functions of geographic information system, analyzes its surveying and mapping in smart cities, and makes geographic information system more widely used.

2. Basic Concepts of Geographic Information System

2.1 Characteristics of GIS
Geographical information system, also known as geological information system, or GIS for short, can analyze and process spatial information and is a computer system used to input, store, query, analyze and display geographic data. Geographical information system is a kind of spatial information system. Specifically, geographic information system uses computer software and hardware system to collect, analyze and simulate data and elements of several environmental elements in geographic space, and graph the analysis and processing results or show it in other forms. Geographical information system can effectively reduce the influence of external factors, so its anti-interference ability is very strong. Compared with other surveying and mapping technologies, this advantage is more prominent. In the process of surveying and mapping through GIS technology, it is necessary to perform automatic observation and adjustment on the ground according to the signal receiving device. Compared with manual methods, work efficiency can be greatly improved. In the process of some complex terrain surveying and mapping, it is necessary to combine the actual situation and reasonably adopt a variety of equipment for combined monitoring [9]. Compared with other surveying and mapping technologies, geographic information system is a highly comprehensive technology. To master this technology well, you must fully understand geography, cartography, computer information technology, and remote sensing technology. Comparing with the traditional technology of surveying and mapping, it can be found that GIS technology can be monitored by satellite, and it can be effectively combined with remote sensing technology, even in some high-rise buildings, it can also carry out high-precision measurement. The surveying and mapping work of the geographic information system has realized automatic observation, not only the efficiency is high, but the accuracy of the data is also very high. In the complicated topographic surveying and mapping, the working time and error rate of the laborers are greatly reduced.

2.2 The Function of GIS
Geospatial data is the blood of the geographic information system. The establishment of the entire
The geographic information system revolves around spatial data for analysis. It mainly uses a layered processing method to facilitate the subsequent development and management of the entire system. Through the geographic information system, the surveying and mapping data can be grasped more intuitively, and the geographic information obtained by the surveying and mapping can be input into the geographic information system to facilitate subsequent management and decision-making. With the help of geographic information system, relevant personnel can greatly improve the work efficiency of route planning, drawing management, situation investigation and resource management. Through this system model, some things can be comprehensively planned and corresponding decisions can be made. The query of spatial data includes graphics, attributes and their cross query [10]. If natural disasters such as fires and floods occur in a certain area of the city, the geographic information system can help the staff accurately and quickly determine the location of the disaster, analyze the topography around the disaster site, and formulate a reasonable and effective rescue plan for timely rescue. To reduce the excessive loss of personnel and property on the disaster site. Through the geographic information system, the geographic surveying and mapping information is collected, analyzed and processed, and the geographic information database is established. On this basis, the integrated output can output more dynamic images and provide reliable data basis for subsequent work.

3. The Function of GIS in Intelligent City Surveying and Mapping

3.1 Data Collection
In the initial stage of surveying and mapping, objects in the objective world should be abstracted and discretized. In GIS system database, two methods, grid and vector, are usually used to store continuous object entities. In order to obtain continuous object entities in data collection, different discretization and abstraction should be adopted in surveying and mapping. In the selection of raster dataset resolution and vector storage mode, the monitoring data are collected and stored by three elements: ground unit grid width and points, lines and surfaces. The traditional data relationship of project management is based on the data relationship based on task-resource. The data relationship model of project management based on task-resource is shown in Figure 1.

![Figure 1 Project management data relationship model based on task-resource](image)

GIS has a strong ability in spatial analysis. In the process of urban society, various types of data need to be integrated before the data can be analyzed. Surveying and mapping personnel can compound the required data, and make reasonable improvements in combination with the actual situation, so as to improve the satisfaction of the final data analysis results. In the process of practical application, GIS technology can be used in a hierarchical processing mode in the database, which is convenient for GIS management and development in the later period. By outputting the original map in this mode and querying and analyzing its space, the original map can be effectively displayed and compared with the processed image. In the initial stage of surveying and mapping, geographic information system can coordinate the location of surveying and mapping objects, most of which are converted into digital data by scanning according to existing data. In the process of practical use, GIS technology can output intuitive images, and set up graphic database. Compared with manual surveying
and mapping, it can greatly improve work efficiency and reduce labor intensity.

3.2 Data Integration Processing
In the actual data conversion process, some lines and intersections in the measurement may be separated or stained. This situation will affect the accuracy of the measurement. Therefore, selective removal should be done to ensure the accuracy of the measurement. The attribute principle mainly includes subjective factors and objective factors. The two objective factors are already existing in reality. For example, some road names have been determined in the process of urban surveying and mapping, and subjective attributes are mainly related to some human factors or natural factors. Make adjustments. Although the accuracy and complexity of various mathematical models are different, it is necessary to integrate projection and coordinate transformation before analyzing the relevant data to ensure the construction of usable models [11].

The core of a smart city is a smarter method by using a new generation of information technology centered on the Internet of Things and cloud computing. To change the way governments, companies, and people interact with each other. It responds quickly and intelligently to various needs including people's livelihood, environmental protection, public safety, urban services, industrial and commercial activities, improves the efficiency of urban operation, and creates a better urban life for residents. From the perspective of information technology, it aims to achieve the purpose of efficient, accurate and convenient urban operation by constructing a complete and advanced intelligent system. Figure 2 shows the architecture of the system.

![Smart city system architecture](image)

**Figure 2** Smart city system architecture

For newly-built buildings, the unique architectural symbol language of traditional building facades and the proportional relationship between various parts of the building can be used in the design of new buildings in the processing of building facades. The use of various modern high-tech technologies has realized the advanced informatization of the city, making information ubiquitous. Figure 3 shows the perception service model of information fusion management.

![Awareness service model](image)

**Figure 3** Awareness service model

In the process of data transformation in GIS system, the data that GIS can't recognize should be transformed into other formats to ensure the compatibility of data between different formats. GIS has a strong ability of intelligent identification, which can automatically identify the attributes of each number in the process of data processing. In the process of digital transformation, it is often necessary...
to measure and control the intersection and separation in the measurement process, so that the measurement accuracy cannot be guaranteed, and it can be cleared and selected reasonably by GIS system in the actual operation process. In the process of data conversion in GIS system, it is necessary to transform the data into a format recognizable by GIS through data reconstruction, so as to ensure the compatibility of different data sources.

4. Conclusions
In the process of building a smart city, geographic information system plays an important role and is also of great significance to the engineering construction of our country. The emergence and development of geographic information system not only greatly reduces the workload of engineering surveying work, but also improves the work efficiency obviously, which is a milestone in the development of engineering surveying and mapping technology, and its social and economic benefits are very significant. In the process of urban planning, it is necessary to use geographic information comprehensively. Firstly, it needs to have a comprehensive understanding of the functions of GIS, and then do a good job in layer management and data editing. In the smart city surveying and mapping work, compared with the traditional surveying and mapping technology, through the application of geographic information system, geographic coordinates and information can be organically integrated, automatic data collection and processing can be realized, and effective digital images can be obtained. With the rapid development of science and technology, people put forward high requirements for regional information system. Geographic information system should not only analyze detailed terrain data, but also have accurate data on location, time and kilometers.

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