

Application of GIS-based Surveying and Mapping Technology in Land Surveying Engineering

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Abstract

At present, land surveying engineering technology has made great progress driven by the rapid economic development. In the whole process, the role of land surveying and mapping has gradually become prominent. In the development process of modernization, the traditional surveying and mapping technology can no longer meet the needs of the times. This paper analyzes the application of GIS surveying and mapping technology in land surveying engineering, gives a detailed introduction to GIS surveying and mapping technology, and gives specific methods and methods for the practical application of GIS surveying and mapping technology in engineering.

Keywords

GIS surveying and mapping; Land surveying; Application.

1. Introduction

The application of GIS surveying and mapping technology in land surveying engineering can improve the work efficiency and work quality of staff. Compared with western countries, the development of GIS surveying and mapping technology in my country is a little later, and there are still problems in many places, which requires technical personnel to GIS technology conducts in-depth research, continuously improves technical standards, and provides reliable and safe technical support for the development of land surveying projects.

2. An Overview of GIS Technology

GIS is the abbreviation of Geographic Information Systems, known as geographic information system, which belongs to a spatial information analysis technology that has emerged in recent years. GIS is mainly composed of computer software and geographic database. It takes geospatial as the basis and has been widely used in the field of resources and environment. It can effectively manage various resource and environmental information of spatial attributes and provide powerful technology for solving resource and environmental problems. support. GIS has high technical content and its importance in land engineering is self-evident. The core of GIS technology is to use data information into geographic graphics, and at the same time, it can analyze changes in geographic information in a timely manner, realize real-time data transmission and sharing, and effectively respond to changes in the geospatial environment.

The main advantages of its application in land surveying engineering are as follows: 1) Data display in the form of space, showing a clear trend of graphic changes, with good intuition and image, which can improve the accuracy of judgment of relevant staff. 2) It has strong multi-dimensional spatial analysis capabilities. In land surveying engineering, spatial information analysis has strong dynamics and complexity. The application of GIS technology can strengthen the analysis of spatial information, which is beneficial to land surveying and can ensure the accuracy of surveying effectiveness.

3. GIS Composition

GIS is mainly composed of geographic database and computer software. Exactly how and when a GIS works is determined by the operator. In the geographic information system, the utilization rate of the computer system is very high, and the cooperation of various components is needed to maximize the role and benefit of the GIS technology. Since GIS is a dynamic geographic model, data also needs to be updated in real time to improve the efficiency of individual programs. The application of GIS technology also requires specialized professionals to ensure the best use of GIS technology.

4. The Specific Application of Surveying and Mapping Technology in Land Surveying

4.1. Programme Management and Programme Evaluation

At present, the shortcomings in planning management and program evaluation are still in the spatial layout, the development speed is slow, and the quality of the evaluation program is not accurate enough, and advanced technical means are needed to solve this problem. GIS technology will enable quantitative evaluation to be carried out in the early stage of urban planning, and accurate land use evaluation will further clarify the construction attributes and scope of planned land for planners, so that relevant work can be adjusted according to the evaluation in a timely manner. In addition, the rational use of GIS technology can also provide convenience for later digital management. With the development of the city, there are more and more kinds of data, and advanced technology must be used to classify and manage the data for better use. GIS technology will also play a role in it, which is more convenient and accurate for data sorting and retrieval.

4.2. Data Processing

In the application process of GIS technology, the processing of data has different characteristics in time and space. In the whole land surveying, important surveying and mapping contents include many aspects, such as the attributes of the land, the ownership relationship of the land, and the status quo of land use. When dividing these data, it mainly relies on the natural attributes and the economic attributes of the society. Natural attributes refer to geographical features such as topography and water resources related to land, while social attributes refer to geographical locations and traffic conditions related to terrain. Through the diverse functions of GIS technology, it can play an important role in the processing of data information. Through this technology, the management level of data analysis can be improved, and the overall development of the land data system can be improved. In a relatively early stage, the processing of digital images was a planar mapping technology, which was also relatively simple, that is, simply recording and photographing. Through the analysis and measurement of the digital processing system, the data could be stored in the system. In the specific measurement process, a large part of the data will be required to go to the field for measurement work, so it is very difficult to store and process the data. Faced with this situation, image processing technology can be used to process the existing map, and the work can only be stopped when

the electronic map is complete and accurate, so that the consumption of manpower and measurement work is also reduced.

4.3. Data Collection

In the application process of GIS technology, the processing of data has different characteristics in time and space. In the whole land surveying, important surveying and mapping contents include many aspects, such as the attributes of the land, the ownership relationship of the land, and the status quo of land use. When dividing these data, it mainly relies on the natural attributes and the economic attributes of the society. Natural attributes refer to geographical features such as topography and water resources related to land, while social attributes refer to geographical locations and traffic conditions related to terrain. Through the diverse functions of GIS technology, it can play an important role in the processing of data information. Through this technology, the management level of data analysis can be improved, and the overall development of the land data system can be improved. In a relatively early stage, the processing of digital images was a planar mapping technology, which was also relatively simple, that is, simply recording and photographing. Through the analysis and measurement of the digital processing system, the data could be stored in the system. In the specific measurement process, a large part of the data will be required to go to the field for measurement work, so it is very difficult to store and process the data. Faced with this situation, image processing technology can be used to process the existing map, and the work can only be stopped when the electronic map is complete and accurate, so that the consumption of manpower and measurement work is also reduced.

4.4. Application of GIS Technology in Land Surveying and Positioning

Geographic information system technology combines GPS technology and RS technology to enable the geodetic project to be fully positioned, especially by using GPS satellites to determine the geodetic position deviation to determine the accurate geographic location in different periods. Locating GIS technical points can reduce the error to less than 0.5%, which is convenient for positioning survey, urban high precision and measurement in construction engineering. Today, this technology is widely used in many fields of smart cities, and can be applied to land resource management on the basis of computer network technology. In the new century, the combination of GIS technology and carrier phase differentiation technology has further improved the measurement accuracy by 30-35%. Surveying engineers need GPS positioning systems to obtain accurate data without entering it into a computer for further analysis. This portable GPS positioning system is able to achieve centimeter accuracy, so precise data can be captured and uploaded to the terminal management system within a few microseconds. This enables managers to make more informed scientific instructions and more informed systemic decisions.

5. Summary

All in all, GIS surveying and mapping technology, as a new technology, plays an important role in land surveying. It not only makes up for the shortcomings of traditional technology and realizes effective measurement, but also has the advantages of low cost and simple control, which can save a lot of manpower, material resources and financial resources, and play a role in promoting the sustainable development of land surveying. The utilization of modern land resources has become the central link of urban development. Therefore, the integration of urban development and technological development is the main development direction of surveying and mapping. Urban departments should develop a group of technicians with modern information processing capabilities.

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