

Research based on the Application of GIS Technology in Forecasting and its Geological Disasters

Lifang Fan

Faculty of Resources and Environmental Science Hubei University, Wuhan, Hubei 430062, China

Keywords: GIS technology; Geological disaster; Forecast

Abstract: With the rapid development of information technology in China, GIS technology has been widely used in geological disaster prediction and forecasting which has promoted the monitoring and early warning of geological disasters and disaster management and has also effectively protected the lives and property of personnel. So this paper systematically expounds on the functions of GIS technology, analyzes on the shortcomings of GIS technology in geological disaster prediction and forecasting, and further explores the application strategy of the GIS technology in earthquake disaster prediction and forecast, in order to reduce the damage caused by geological disasters to people's lives and property, and to achieve an effective governance of the geological disasters.

1. Introduction

Geological disasters are kind of natural disasters that are seriously harmful, the occurrence of geological disasters will cause serious damage to the natural environment and also causes great damage to people's lives and property, but the GIS technology is used to analyze the geographical structure of the high-incidence areas of the geological disasters and the corresponding areas are effectively monitored so as to predict and forecast the geological disasters to prevent and treat them on time and as well promote the effective management of geological disasters. Meanwhile, in the actual application process, it is necessary to continuously improve on the development of GIS technology and improve on the accuracy of the geological disaster assessment risk and prediction in order to reduce the damage caused by the geological disasters to the natural environment, and protect the lives and property of the people.

2. Application analysis of the GIS technology in prediction of geological disasters

GIS technology is to collect and process geological information of a specific areas under the support of information technology, and to establish a corresponding geographic information system, the GIS technology has map management function that can store a large number of map resources in the information system and according to the actual situation, the situation is adjusted accordingly and the map management function of GIS technology is more flexible and precise than the traditional map function which is helpful for geological disaster management.

Secondly, the GIS technology has the function of information conversion that can process digital information into geographic information images and can guarantee the logical consistency with the original data. In addition, GIS technology has a series of functions such as search and query, operation and analysis, so it is possible using the GIS technology, to collect and analyze the geographic information in order to establish a corresponding geographic information database, and conduct a real-time monitoring of the geological disasters in the corresponding areas through technical linkage. During the monitoring process, the factors that induce the geological disasters can be effectively analyzed through a three-dimensional space model, which is to conduct a comprehensive assessment of the occurrence of the geological disasters and use this as a basis to predict and forecast on the geological disasters.

The GIS information system has obvious advantages in the information processing unit, the information can be transmitted to the user in the form of pictures and texts, and the geographical

location and related information of the pictures can be displayed in a three-dimensional manner and will effectively satisfy the information needs of the user because the information systems have been widely used in strategic planning and geological disaster prediction. At the same time, GIS technology plays a vital role in the management of geological disasters and at present, the GIS technology has achieved a remarkable results in the process of geological disaster research, but there are still series of problems in the practical application process. First, the GIS information system is not perfect, and the accuracy of the regional geological disaster prediction also need to be improved, because the use of the GIS technology to establish a geological disaster system is too long and in the actual application process, the relevant staff should continuously optimize and improve on the GIS technology, so that the GIS technology can play a better role in the geological disaster prediction and forecasting.

3. The application strategy of the GIS technology in prediction of geological disasters

3.1. Using the GIS technology to build a diversified information of the database

The occurrence of the geological disasters has obvious uncertainties, but the use of the GIS technology can statistically analyze the occurrence of geological disasters, that have full understanding of the location, grade and frequency of the geological disasters, and also which understands the occurrence of the geological disasters. Omen and related phenomena, to achieve prediction of the geological disasters. In the process of geological disaster prediction and forecasting, huge information data is needed as the research basis, such as the geological information data and terrain number information data which the GIS technology can be used to integrate and analyze on the relevant information. In the process of geological disaster prediction and forecasting, the application of GIS technology is a complex project, which requires a large amount of geographic information to be collected and processed. The geographical information sources are extensive and involve many contents, including geological structure, topography and geology, etc. In the process, it is necessary to use GIS technology to establish an information database that uses the information on the database to comprehensively evaluate the geological disasters and effectively analyze the frequency, specific location and level of the geological disasters, and to also effectively understand the signs before the geological disasters and improve on the accuracy of the geological disaster prediction and forecasting.

3.2. Conducting real-time monitoring of frequent occurrences of geological disasters through GIS technology

Using the GIS technology is to effectively collect the information of the geological disasters, based on this, the frequency of the occurrence of the geological disasters can be understood and the chart images can be established based on the actual conditions and the technology can also effectively be used to monitor the specific areas. During the monitoring process, It will analyze and understand the induced factors of the geological disasters in this area and combine the actual situation to effectively control the factors that induce the geological disasters and At the same time, the GIS information system will be used to establish the model of the space surrounding and the occurrence of the geological disasters in this area will comprehensively evaluate and use it as an effective basis for predicting and forecasting the geological disasters. In addition, using the GIS technology, in the real-time monitoring process of frequent occurrence of the geological disasters, is necessary to organize and analyze on the multi-database and improve on the data construction in the geological disaster area, and use the data information to establish a regional image Table to effectively monitor the geological conditions of the area. At the same time, it is also necessary to use the monitoring information to deeply analyze the induced factors of the geological disasters and to effectively control the hazard factors in order to minimize the occurrence of the geological disasters because the GIS technology has obvious advantages in the process of the geological disaster monitoring, but in the actual application process, the relevant staff should continuously optimize and improve on the GIS technology, to improve on the accuracy of the geological disaster

and achieve effective geological disaster management.

3.3. Establishing a geological disaster analysis system using the GIS technology

At present, the development of the GIS technology is becoming more intelligent and comprehensive because in the actual application process, the integration and comprehensiveness of the GIS technology information can be used to establish a spatial model to promote the prediction of the geological disasters because the generation of geological disasters has a certain time limit and spatial extent and the formation mechanism of the geological disasters is very complex, as there are many triggering factors like the earthquake disasters that have certain unpredictability. However, the GIS technology can effectively collect and process the various geological disaster information and effectively analyze the environmental factors of geological disasters together with time and space dimensions, and can also effectively assess the probability of the possible geological disasters, that the use of the GIS technology and risk analysis system is to establish a geological hazard analysis model that gives full play to the GIS map management functions, information transformation functions, etc., which is to reduce the uncertainty of the geological hazard risk analysis.

3.4. Using the GIS technology to improve on the geological disaster evaluation system

A sound risk assessment system can effectively predict the geological disasters. In the actual application process, the GIS technology should be used to establish a complete and rigorous regional geological assessment system, the theoretical research should be conducted to understand the relevant situation of geological movements and the corresponding predictions should be established based on the multi-information database, the model is to achieve the prediction of geological disasters. At present, the GIS regional geological hazard assessment system mainly includes two types, one is the theoretical evaluation system, the other is the empirical geological risk assessment system, and the theoretical evaluation system is mainly based on the geological movement theory to establish the geology. While the model is to achieve a risk assessment of geological hazards, with an empirical assessment system is relying on the GIS technology to collect the information of the geological disaster in the region, and using the information technology to calculate the risk of each unit in the region, and then classify the risk of geological disasters, so that the prediction of geological disasters will be more intuitive. In addition, the use of GIS technology is to improve on the geological disaster evaluation system that can combine with the theoretical knowledge that has specific problems, secondary the development of geological disaster evaluation and prediction model, is to improve on the accuracy of regional geological hazard risk assessment and achieve an effective prediction of geological disasters.

4. Conclusion

The governance of geological disasters is a complex and systematic project, that in the actual the governance process, it should be prevented from happening, the prevention should be prior, and the governance should be followed, making an overall planning for the geological disaster prediction and forecasting system, using the GIS technology to build a dynamic database, in order to provide a basis for decision-making by the relevant departments, and use the GIS technology to monitor the frequent occurrences of the geological disasters in real-time, to establish a geological hazard analysis system, and improve on the geological disasters evaluation system, thereby effectively controlling as well improving on the accuracy of regional geological disaster assessments, predict and forecast on the geological hazards, and achieve an effective geological disaster management.

References

- [1] Cheng Guangjun. Application of GIS technology in geological disaster prediction [J]. SME Management and Technology (late issue), 2019 (04): 164+166.
- [2] Guan Zhiyu, Zhong Qiuwen. Application of GIS Technology in Geological Disaster Prevention System[J].Information Recording Materials, 2019,20(02):80-81.

- [3] Chen Huan, Sun Jinhui, Yan Tao, Li Jinyang, Zhao Chong. Risk Assessment of Geological Disaster Based on GIS Technology--Taking Kaiping Township of Beichuan County as an Example[J].Exploration Engineering (Rock and Soil Drilling Engineering), 2018, 45 (08): 65-71.
- [4] Xia Xingbing.Application of GIS Technology in Geological Disaster Monitoring and Early Warning[J].Computer Programming Skills & Maintenance,2018(06):151-153.