THE EXPLORATION OF DATA MINING AND WEBGIS TECHNOLOGY IN AN EMERGENCY RESCUE SYSTEM

LV Yan [a, b,*], ZHU Yi [a]

[a] Government GIS Research Centre, Chinese Academy of Surveying and Mapping, No.16, Beitaiping Road, Haidian District, Beijing, China
[b] School of Geomatics, Liaoning Technical University, Fuxin, Liaoning, China

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ABSTRACT:

Based on the actual needs, it is to explore the application for rescuing emergency combined with data mining and webGis technology. Give out the data mining based on the previous emergency-related data, and then establish the early warning models. It provides the practical application as a part of the social services by applying the forecasting analysis for early warning with the help of some previous phenomenon and the related information, and also by issuing the related early warning report and an emergency situation by WebGIS. Combined with WebGIS technology, to set up a data mining model, will be helpful for exploring the contingency plans.

1. INTRODUCTION

The society is moving to the direction of intelligence in currently, how to deal with emergency situations and improve the efficiency of rescue so as to reduce losses has become a hot topic of scientific research. And the reasonable solution to it is also conducive to social harmony and security. The emergency system has begun to been used in exploring practicality, but also the treatment needs the further explore. Use the intelligent edge and reduce losses from the perspective of efficiency is the inevitable trend of future development. From the perspective of efficiency to reduce losses is the inevitable trend of future development. The establishment of an effective emergency warning system will help to achieve effective relief of the social significance on the side of the early worning and resue-plans.

This article is to explore for the related emergency and to achieve the application of computer networks and intelligent for the rescue system with the support of data mining and WebGIS, and ultimately to improve the efficiency of emergency response combined with the dynamic-rescue system which is based on the geospatial information.

2. THE RELATED THEORY

Data mining is a data-processing technology which is to get the useful intelligent and information resources by dealing with the collected data with the help of intelligent technology .It not only get the surface information, but also get the intrinsic properties and the implied information by the fully understand to them. Getting the associated information on the analysis to the relevant factors will provide the necessary technical support for building model.

The web is the principal means to achieve the real-time release. Making the model based on the real things' structure on the basis of geo-spatial information and then with the help of it holding on the management for the data and the query in some means of the query and analysis will provide the conditions for the dynamic query, spatial analysis and even the decision-making application.

WebGIS has a lot of advantages that traditional GIS unmatched, that the   users can visit the server at any time and place which expand the use-range of the data and facilitates the sharing of information. It can put the latest data available to the user with low premise for Customer's equipment, which makes user access the remote heterogeneous data comfortably. The technology doesn't need the client-side maintenance and is also with cost-saving compared with the traditional stand-alone GIS. The advantage of WebGIS offers the technical support for the timely release of the emergency information. WebGIS technology can improve the transparency of emergency, in order to provide a real emergency information and emergency response information for the public, and all so offer the necessary information support.

Data mining technology can offer the prevention and mitigation for the pre-emergency based on the occurrence model established from the analysis to the factors of historical data. Based on the data mining technology and WebGIS technology, establishing a set of services system about emergency for the Government and the public and achieving the dynamic emergency reduction by computing technology have some social value.

3. PLATFORM MODEL

Supported by the data mining and combined with relevant historical data, to establish the early warning forecast model and at the same time to rectify the model integrated with the dynamic update for the real-time data by which forecasting model the system can offer the early warning.

Combined with the actual conditions such as the rescue facilities and equipment establish the based contingency model, at the same time by the set of parameters dynamically updated

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* Corresponding Author: Lv Yan in GIS, Tel: (010)88217807, E-mail:clsdau@126.com .

based on data rescue situation it gives out the realization of the emergency.The correlation model is as follows.

3.1 Presentiment Model

Combined with the quantify-result for the related factors of the past cases collected the generic early warning model is as follows:

$$P = \begin{pmatrix} X1 \\ X2 \\ X_{i-1} \\ Y0 \end{pmatrix} \begin{pmatrix} a11\ a12\ a13\ \dots\ a1i \\ a21\ a22 \\ a31 \\ \ .\ . \\ ai1 \qquad\qquad aii \end{pmatrix} \begin{bmatrix} X_1 X_2\ \dots X_{i-1} Y_0 \end{bmatrix}$$

Remarks: a_i the weight;

x_i the value-Quantify of corresponding factor

y_0 the quantitative factor about incident happened

P   the probability of the accident

But in practical application the correlation coefficient matrix of the model is different to get. Therefore to find the factors with the synchronous trend by data mining technology，and merger these factors and orthogonal to the remaining factor , then set up the optimization model can give a better practical model which is as follows :

P' =b1 x1+ b2 x2+ b3 x3+ --------+ bj xj   (j$\leqq$i)

That is: P' =$\sum$ bj xj

Remarks：bj   the weight;

xj   the abstractive behalves of the simplified factors

P'   the probability of the accident

Testing the model combined with the examples can offer the weight coefficient for the related factors .With the help of the forecast information on the associated factors and the threshold alarm system for the disaster occurrence; it offers the implementation on corresponding disaster reduction combined with the alarm prediction information. If it can get the new data, the model will give some other parameters when it is needed for correcting the model. By the way the system can apply the dynamic presentment.

3.2 Help-model

Build the rescue model related the road traffic, weather, emergency facilities, as well as other factors, and then set up a traditional module for improving the efficient and establish the special module for the especial practical application. Considering the priority level it sets the rescue traditional contingency module; considering the priority level of individual operations is different from traditional settings, it achieves the establishment of rescue emergency personalized modules.

The settings of traditional contingency model: First, it should refine the relevant links in the design of the rescue process and establish the factor elements for every factor, combined with the historical database improve the overall efficiency index in different combinations of factors.   To determine the mathematical models through the test for the different combination of factors and at last to find the best rescue option

in the light of actual conditions. The model is as follows:

Regulation of every pregnancy factor disaster is as follows:

$$y_{ij} = (x_{ij} - \overline{x_j})/S_j$$

$$\overline{x_j} = \frac{1}{n} \sum_{i=1}^{n} x_{ij}$$

x_{ij} : the i Pregnancy factor disaster of the j sample.

The square deviation of each column as follows:

$$S_j = \sqrt{\frac{\sum_{i=1}^{n} (x_{ij} - \overline{x_j})^2}{n-1}}$$

At last it can obtain various factors after regularization.

Model-specific emergency settings: It should open up the rescue-priority levels of targets based on the traditional model and achieve the targeted relief according to the actual needs of users. The rescue-priority levels should be opened before the regulation of every pregnancy factor in the traditional model.

4. FRAMEWORK INTRODUCTION

First, the design of the rescue process to refine the relevant links, all tied for the establishment of the factor element factor, combined with the historical database to achieve combinations of different factors in the overall efficiency index, through the combination of different factors test to determine the mathematical model, in the light of actual conditions in the rescue to find the best option. The system explore the rescue application mainly from two aspects: （1） Early warning module   combining the characteristics of disaster information and the application of data mining technology, it can offer the occurrence model of disaster and provide a basis for early warning; (2) Inquiries and emergency rescue module   achieve the automatic enactment of the plan for rescuing efficiency traditional or the man-made interference and provide the protection for the rescue efficiency. In support of the WebGis, to organize and collect the relevant thematic information and spatial geographic information orderly, then to bring about the releasing spatial data, spatial query retrieval, space model service, organizations of Web resources and so on based on spatial data management, and at last to offer the provision of advance warning and related policy-making functions to emergency departments. The module can be used to update and forecast the real-time data sources of the related emergencies which are with geographic information in the electronic map, to provide a platform to keep abreast of information for the public which can be achieved on the fuzzy emergency search by the fuzzy search settings. And it also can submit the information of accident situation in the exact time according to a specific time and the exact location.

On the side of data processing, it makes the image more vivid presentation combined with self-developed dynamic Symbol Library based on the production technology of dynamic symbol in symbol editing software.

As the emergency-rescue is still in the exploratory stage, all

relevant departments still haven't formed system yet in the system's maintenance. So the database-update and maintenance are all by manual operation. At present, a variety of sensors can measure temperature, humidity, noise, light intensity, pressure, soil composition, the size of a moving object, speed and direction, and many other interested physical phenomena to users. An early warning mechanism remains to be further explored with the helps of the related measurement data from sensor, electronic map, the basic information database and the expertise from experts.

Because the model based on the overdue data can't avoid of some early warning errors, the dynamic emendation to the existing data model based on the dynamic collection of the actual data who can update the model should be made for improving the forecasting accuracy more effectively. Taking the actual operating costs and effectiveness into account, the function of the decision-making routes are only opened to the relevant departments. In the system the user-level permissions can ensure the efficient and effective application scope.

5. CONCLUSION

This study achieves the initial idea of the system platform. Currently there have been some applications for natural disasters. As the effective emergency relief has practical significance to community and are good for the harmonious society , building the system what can be used to improve the rescue efficiency and reduce the losses are up to date with the degree of public's attention increasing year after year. In computer technology and intelligent, and multi-factor algorithm to improve the support of multi-dimensional model, combined with the exist data and expertise, make full use of the basic mapping information, carrying out the rapid positioning, releasing the location of the incident and the attribute information and at last realizing the statistic, forecasts and analysis for the emergency will provide a reference for relevant departments to improve the efficiency of rescue.

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