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Design and Implementation of City Fire Rescue Decision Support System

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Abstract

The authors introduced major geographic data management platform ARCGIS , and developed city major fire extinguishing rescue decision support system based on GIS, by using ArcGIS Engine and VB, according to a large number of decision support system and fire fighting rescue strength model advanced. City major fire extinguishing rescue decision support system based on GIS is integrated with several functions, including layer management, query, fire analysis, fire force calculation, and dynamic visualization plan of fire fighting and rescue. This paper mainly introduced the system function, system design and system implementation.

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Keywords: fire command; decision support; geographic information system

1. Introduction

With the fast development of city construction, fire protection work occupies a more and more important part in the city disaster of prevention and reduction [1], City fire decision requires large amounts of comprehensive and accurate information, and requires fast and accurate decision-making and avoiding delaying to extinguish fire [2, 3].The improper command is one of the reasons of Xi'an liquefied gas explosion. There was a lack of scientific rescue force model which failed to quickly dispatch the rescue force, delaying the rescue time, resulting in a large number of casualties and property losses. Therefore, the development of city major fire extinguishing rescue decision support system based on GIS is imperative, so that the fire department quickly generate the rescue plan and effectively dispatch force and scientifically use fire resources, in order to minimize the loss of life and property with minimal cost.

2. System functions and design process

2.1 System functions

The system is capable of managing and operating effectively all kinds of spatial and non spatial attribute data, in which, all kinds of key unit with fire and explosion risk and the city fire brigades are managed graphically, which greatly improves the work efficiency of the fire department, at the same time ,the system realizes the functions of fire locating, fire fighting force calculation and so on based on effective management of large spatial database for all kinds of data , by application of geographic information system spatial analysis model and fire related calculation model, which improve the fire rescue team

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overall emergency response and joint combat capability. Its functions is shown in figure 1

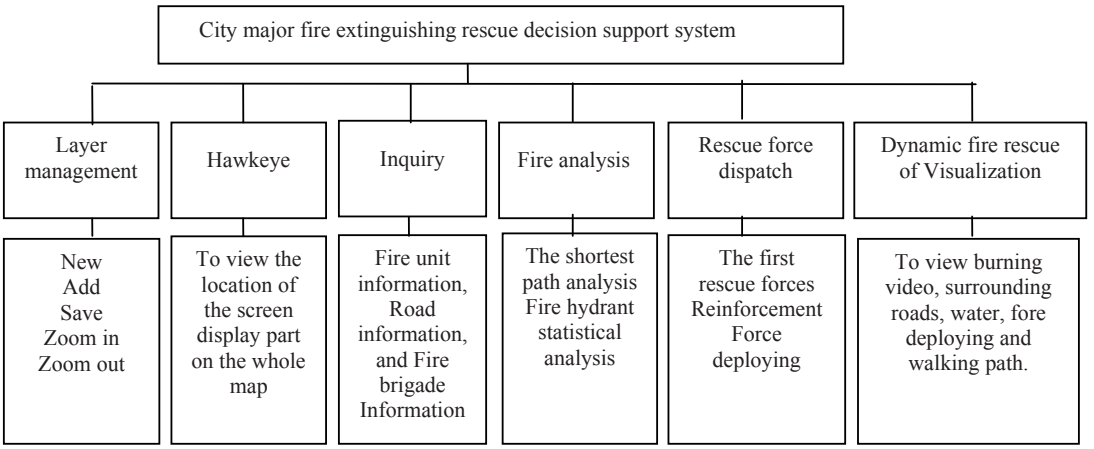

Fig 1 systems function diagram

2.2 System design process

Basic design idea of the system is to use the functions that ArcGIS manage effectively map data and flexiblely display data, then, to use VasiualBasic6.0 to realize that fire spatial data and attribute data support the functions of fire command and decision. System design process is in figure 2.

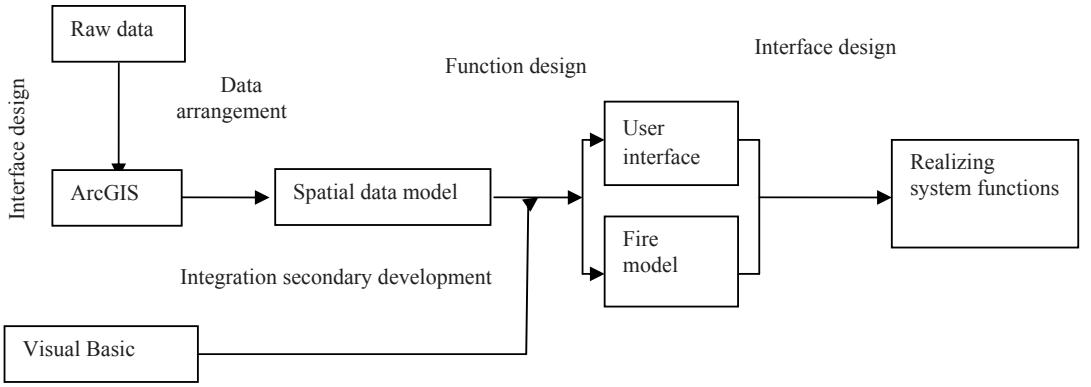

Fig 2 system design flowchart

3. The design of fire extinguishing rescue decision support system

3.1The principle of system design

Application of GIS system function design should abide by the following principle [4]:

Firstly, System function structure rationality: It refers to the system function was divided and integrated reasonablely according to design ideas of system theory.

Secondly, System function structure Completeness: The system is fully functional; meet the application requirements, according to the system application requirements.

Thirdly, independence characteristic among system function modules: all kinds of modules should be independent on each other, each function has a set of completed processing functions.

Fourthly, the system reliability of function modules: System operation should be reliable.

Fifthly, easy operation characteristic of Function module: The child modules should be operated conveniently, which is simple and clear, and easily operated by fire personnel who are not majored in GIS.