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## VISUAL DESIGN OF INTERFACE LAYOUTS FOR GIS-BASED EMERGENCY MANAGEMENT SYSTEM

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*By combing the research status of GIS (Geographic Information System) and emergency management system, from the characteristics of GIS emergency management system, based on the interface layout visual design, found the common problems in the design and operation process, put forward the corresponding design solution strategy, so as to help the GIS emergency management system interface design and the improvement of man-machine efficacy operation performance.*

**Key words:** *Interface design, geographic information system, emergency management system, interface layout*

### INTRODUCTION

GIS (Geographic Information System) as a geographic map space data, computer technology, telemetry remote sensing technology as a cross integration discipline, through the support of computer software and hardware support, build a two-dimensional or three-dimensional digital visualization space to collect, processing, analysis, transmission, simulation and present all kinds of events and information content, through the geographic information area content, solve the complex task planning, search, decision-making and management problems [1]. And has been widely used in many important areas, such as transportation, healthcare, environmental monitoring, spatial mapping, urban planning, emergency management and military posture [2].

With the continuous emergence of various emergencies in recent years, The application situation, category and information of the emergency management system interface will also change accordingly, Driving the display interface of complex information systems for emergency management, It is also a severe test for the designers of emergency management systems, The main problem is no longer the speed and storage of computer hardware devices, But the change to how to enable the operator to work in a particular working environment, Effectively perform the typical cognitive tasks of emergency management systems, And it can ensure that the operator's cognitive compliance and personal state are maintained at a relatively balanced level, Thus to meet the increasingly complex GIS emergency management system [3].

### PURPOSE

Through VOSviewer analysis the keywords information with a frequency of GIS interface in Web of Science in the past three years, we found that as shown in



Figure 1, the main objectives of the study were three cluster groups: information area, user area and domain area. The information cluster area mainly shows the basic design method, framework structure and decision task of GIS interface construction; the user cluster area mainly covers the user interface platform, functional requirements and information comparison method; and the domain cluster area shows regional distribution change and evaluation.

Therefore, with the rapid development and application of GIS digital interface, GIS, as a visual performance window of information presentation, plays the role of channel interaction between information data and operators, so meeting the requirements of human-computer interaction design has become the research focus of GIS interface design.

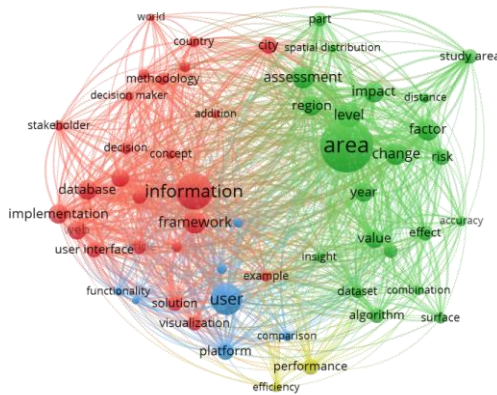


Fig. 1. GIS keyword cluster map

## RESULTS AND DISCUSSION

Emergency management system based on geographic information, occupy the main position in the system interface is the display of geographic information, can let the operator maximum learn real-time information data, is also the most intuitive method, usually at the interface of the overall bottom, the upper with data information or popup, part is translucent, can make the operator in use the widest information and strong immersive experience[4].

The layout scheme of GIS emergency management system interface can be divided into the following types:

### (1) Regional layout of the columns

According to the law of human visual movement, the layout of column area is the most common scheme of interface layout design, which conforms to the "F" type and "Z" type saccade state of human eyes, which is conducive to the search of information while taking into account the display of geographic information. Therefore, the column area is mainly divided into four types: "Side open" type, "Three" type, "Mouth" type and "Concave" type, as shown in Figure 2.

"Side open" type layout, by placing the system name, navigation bar, menu bar, search bar and other primary information on the top, left or right side of the



interface, the corresponding position is the toolbar information, and the middle part is the geographic information data.

"Three" font layout, by placing the primary menu bar or toolbar on the top or bottom of the interface, the middle part is the geographic information content, the overall visual sense is strong, in line with the law of vertical recognition of human eyes.

Compared with other font layout, "Mouth" type layout can carry the most functions and information data, surrounded around, the visual sense is more balanced and stable, but the disadvantage is that the amount of information, resulting in a high degree of visual complexity.

The "Concave" character layout is close to the "mouth" character type, but its commonly used functional space will give a relatively independent space area, which is not completely closed, and can play a certain sense of visual density and contrast, to avoid the overcrowded interface.



**Fig. 2.** Regional layout design of the four columns ("Side open, Three, Mouth, Concave" type from left to right)

### (2) Block partition layout design

Block partition layout is through the different function bar and function control using block area, different function columns have obvious space boundaries, can set off on the underlying geographic information content, the block partition column area layout compared to the function content to clear reasonable division, at the same time, avoid column type more rigid style, but if the block information too much, is more likely to produce messy visual effect. As shown in Figure 3.



**Fig. 3.** Block partition layout design

### (3) Activity pop-up window layout design

Activity window layout no fixed window area location, different function commands feedback pop-up activity information display of the window, each window has independent zoom, switch control mode, and can drag by the operator to reasonable location, can adjust the geographic information area content occlusion, is in line with the operator click on the target after the natural feedback mechanism, and has the interface highly free and customizable way, realize the importance of interface information partition. As shown in Figure 4.



**Fig. 4.** Active pop-up layout design

Therefore, from the perspective of interface layout analysis, need the function of the emergency management system instructions according to the information importance hierarchy of reasonable placement, fully considering the interaction, the most commonly used commands, placed in the mouse or touch screen most convenient position, such as the position of the bottom of the screen as the main functional operation area, the information display area on the right side of the screen, system menu and search navigation area at the top of the screen, and in a relatively striking position of real-time monitoring rolling status bar, fully consider the visual cognition of the human eye and conform to the operator's use habits and psychology.

For relatively complex functional commands, make a reasonable partition within the interface. Regions with boundaries or without boundaries can be used in partition. For regions with boundaries, we should pay attention to the form of the boundary line frame, while the boundless regions need to fully consider the interval relationship between regions to avoid the confusion of multiple regions.

In the same interface, the number of major functional areas is not more than 10. For multiple functional controls, they can be placed centrally. If there are more than 10 functional areas, they can be integrated again as much as possible or placed at the second level according to the information level to avoid information redundancy.

## CONCLUSIONS

This paper systematically expounds the characteristics of GIS emergency management system and the main categories of interface layout, by analyzing the characteristics and existing problems of different interface layout, to the existing interface layout of the operator physiological, psychological perspective of the operator to reduce the cognitive load, can more effectively promote the operator to interact with the information in the GIS interface.

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