

Beijing-Tianjin-Hebei Emergency Rescue Cooperative Mechanism: From the Theories to Applications

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Abstract: Beijing-Tianjin-Hebei emergency rescue cooperative mechanism is studied from basis to the applications in this paper. Rescue work has always been an important means in emergency management of production safety, and it is a basic channel to ensure the personal safety of production personnel. Therefore, as an enterprise's safety production emergency manager, it needs to pay the attention to the importance of rescue work in safety production management, and gradually highlight the advantages of emergency management work. Faced with multi-source heterogeneous complex environmental data in emergency rescue, a three-dimensional visualization system is urgently needed, which can realize the efficient loading of massive vector data and three-dimensional object models, and the spatial fusion of the multi-source heterogeneous data. This paper integrates the novel ideas to propose the efficient methodology.

Keywords: *Beijing-Tianjin-Hebei; Emergency Rescue; Cooperative Mechanism; Applications*

I. INTRODUCTION

China has frequent natural disasters. Disaster relief tasks are heavy, and some natural disasters occur suddenly. At the same time, with the occurrence of secondary disasters, the complex situation of casualties, property damage and environmental damage caused by the disaster has brought severe challenges to emergency rescue. In the manual rescue operations, subject to environmental conditions and subjective experience, it is often faced with many problems such as difficulty in comprehensively grasping the disaster situation, difficulty in predicting the development of the disaster, difficulty in decision-making in emergency response, and hidden danger to personnel caused by the high-risk operations. Faced with multi-source heterogeneous complex environmental data in emergency rescue, a three-dimensional visualization system is urgently needed, which can realize the efficient loading of massive vector data and three-dimensional object models, and the spatial fusion of the multi-source heterogeneous data.

In the figure 1, we demonstrate the sample framework. Based on the literature review, the current application scenarios of the AI based approaches can be summarized as the follows.

1. In disaster emergency rescue operations, there are many important targets that need to be identified and searched in time. For example, in the rescue of earthquake disasters, identification of buried personnel, identification of hazardous buildings, and movement of people in the disaster area, etc.
2. After the occurrence of the natural disasters, because of the rapid change of the disaster situation and the complex environmental conditions, it is sometimes difficult for emergency rescue workers to respond quickly, often facing the high-risk working environment, and may also face the risk of life when it is serious. By using intelligent sensing, intelligent navigation and planning, the robot can replace the manual entry into the dangerous area to search and identify the target, and operate according to the procedure, which reduces the safety hidden danger of manual disposal.
3. In the process of disaster emergency management, faced with a large amount of data and information base formed by disaster situations, power resources and environmental conditions, managers need to extract value information in a timely and effective manner, judge the development of disaster situations, clarify rescue priorities and joints, and rationally allocate power resources. At this point, artificial intelligence technology can simulate the role of a staff assistant, build a disaster analysis model through deep learning, and classify and mine a large number of disaster information.

With the development of browser 3D rendering technology, WebGL as the core of cross-platform Web graphics rendering standards is becoming more and more perfect, and 3D rendering can be performed in ordinary browsers. Because no plug-in or browser extension is required, the system has good ease of use and maintainability. The data in emergency rescue is complex and diverse, mainly including basic geographic information data, life detection equipment data, detection data and on-site environmental data, which constitute a multi-source heterogeneous dataset in an emergency rescue scenario. The target characteristic data involved in the multi-machine joint life detection have the characteristics of complicated data content and loose structure. These data include remote sensing image data covering multi-phase, multi-resolution and multi-sensor type, as well as the operation data of microwave life detector itself and the detected target data. Therefore, in the face of such complex and diverse data, it is necessary to solve the organizational management ability of mass target characteristic information, solve the problems of rapid association between target data, and lay the data foundation for mass target characteristic data storage management and efficient access. Hence, in the following sections, we will discuss the proposed methodology in detail.

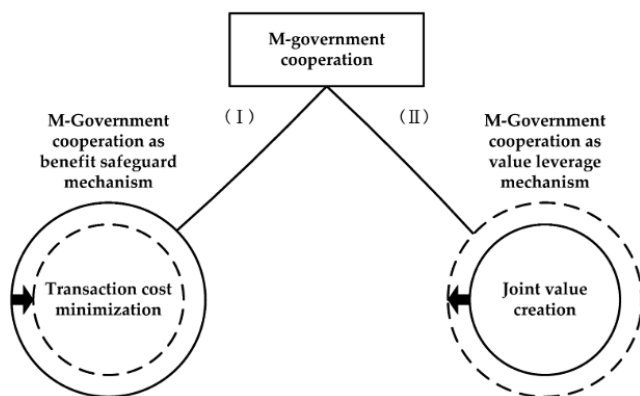


Figure 1. The Framework of the Emergency Rescue Cooperative Mechanism

II. THE PROPOSED METHODOLOGY

Beijing-Tianjin-Hebei Cooperative Mechanism. The construction of smart cities is essentially a manifestation of coordinated development. For the integrated development of Beijing, Tianjin, and Hebei, the realization of the construction of Beijing, Tianjin, and Hebei smart city clusters is the basis for promoting the coordinated development of the three places. Therefore, to promote the integrated development of Beijing-Tianjin-Hebei, it is necessary to further speed up the construction of Beijing-Tianjin-Hebei smart cities. Through the construction of smart cities, the three places will realize resource sharing, information interchange, and industrial transfer, and provide high-quality for the coordinated development of Beijing, Tianjin, and Hebei Urban environment support.

First of all, the construction of the Beijing-Tianjin-Hebei smart city cluster should take the information infrastructure as a pioneer to realize the intelligent development of urban information resources and achieve city-wide network coverage that improve the level of urban information technology. Therefore, because the Beijing-Tianjin-Hebei smart city group has many sources of information and complex channels, a cross-domain collaborative information platform should be established to collect and organize information to eliminate obstacles to information flow, so that information flows rationally throughout the smart city group and fully functions. Secondly, we should pay attention to the development of the Internet of things industry, the Internet of things industry is the internal driving force of the development of intelligent city, the Internet of things industry under the construction of intelligent city is developing rapidly, and our country has successively issued various Internet of things support policies. With the coordinated development of the three places in Beijing, Tianjin and Hebei, the construction of the urban wisdom should gradually promote the development mode of various fields from the angle of economic and social development, construct the comprehensive intelligent development mode of the city, and create a high-quality environment for the balanced development of industry in Beijing, Tianjin and Hebei.

In an era of underdeveloped industries, economic and social ties are inconvenient, and the flow of people, goods, and energy is limited. Due to the gradual deepening of the reform and opening up cause, China's infrastructure development is changing with each passing day and time and space is shrinking. The degree of relevance and integration of economic and social development in different regions has increased, and the openness and mobility of society have become increasingly apparent. The physical impact of an emergency occurring in one place will rapidly expand to other areas, especially neighboring areas. There is a large difference in the level of economic and social development and the ability of social governance between Beijing, Tianjin and Hebei. China is a government-led country. The allocation of the various resources shows an "inverted pyramid" configuration: the higher the administrative level, the richer the resources under control, the easier it is to get the benefits of policy tilt. As far as Beijing, Tianjin and Hebei are concerned, Beijing is China's capital, political and cultural center, and "Shoushan District", Tianjin is a municipality directly under the Central Government, and Hebei is a relatively lagging province. Beijing, Tianjin, and Hebei actually formed a potential gap in which the level of development and the ability to govern decreased in order. In the context of the integration, Beijing-Tianjin-Hebei requires emergency cooperation, not emergency cooperation. In other words, this is not a simple relationship between the three places to help each other in

emergency management, but to form a community of destiny to deal with cross-domain emergencies. Cooperation is higher than collaboration. Under the concept of cooperation, the support given by each party to the other party is reserved, and the intensity can be large or small; under the concept of cooperation, the support given by each party to the other party is unreserved and dedicated.

Emergency Rescue Cooperative Mechanism Application Scenarios. Compared with the existing systems, the existing systems focus on solving the problem of geospatial data fusion. In this paper, dynamic detection data, geospatial data, environmental data, and historical data are managed and visualized on a unified platform. Hence, we consider listed aspects. (1) Professional rescue. This concept requires the technical expertise and also equipment expertise of the rescue team, and can effectively judge major dangers, and managers should not direct blindly. Especially in flammable and explosive areas, chemical supplies areas, and metallurgical and petroleum areas, the professionalism of rescue personnel is extremely high. This is the "specialized person to do professional work" in emergency management, and gradually strengthen the emergency rescue effect. (2) Efficient rescue. This concept is reflected in the ability of rescue workers to seize the golden rescue time, flexible and scientific use of rescue facilities, as well as various advanced instruments and software, optimize emergency rescue activities, and open the way for victims to escape in the shortest possible time. (3) Precision rescue. In the emergency management of production safety, managers are committed to precise rescue. In other words, in the process of rescue to clear all the debris, try not to do unprepared rescue and try to save more victims in the shortest possible time. The word precision embodies the scientific order of rescue activities, ensuring that every rescue link can be seamless, highlighting the concept of the supremacy of life.

The intelligent advantage of GIS in spatial data integration and analysis is highlighted in the decision-making assistant system of UAV urban emergency rescue based on artificial intelligence technology, because GIS has the ability of collecting geospatial information, it can better present the dynamic and spatial nature of data collection. The intelligent principle of GIS application takes the geographic information collected by the UAV in the accident site as the research object, and takes the geographic analysis and decision-making as the research object, through the collection and dynamic management of the spatial geographic data of the emergency rescue scene, the command center system arranges the geographic information formed by the command center system, and generates the rescue information of the road traffic and medical treatment institutions around the accident site by geographical analysis method, so as to grasp the road traffic running state of the emergency scene in real time, and realize the intelligent control and management of the emergency casualty evacuation and treatment work in the accident scene. In the figure 2, we present the details.

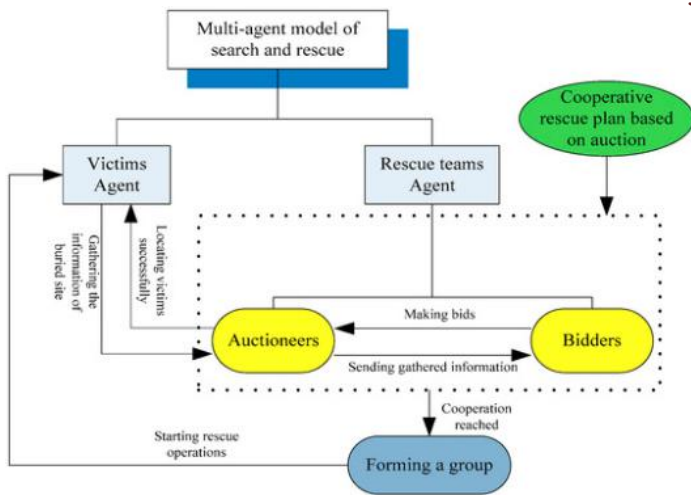


Figure 2: The Emergency Rescue Cooperative Mechanism Application Scenarios

SUMMARY

Beijing-Tianjin-Hebei emergency rescue cooperative mechanism is studied from the basis to the applications in this paper. In the rapid development of modern information technology, a variety of advanced scientific information technology has gradually poured into the emergency management of production safety, bringing great impact and challenge to it. So, emergency managers must attach importance to production safety in the process of the production safety emergency management of the rescue work, for on-the-job personnel regularly organize its production safety emergency publicity and education activities, strengthen the safety awareness of staff in the thoughts, and through professional rescue technical training, strengthen professional skills and professional rescue workers, so as to build the relatively professional production safety emergency rescue team management, gradually promoting effect of emergency rescue in our country, to ensure the safety of the people's production and living. This paper presents the novel idea that will promote the further studies.

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