Research Article

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Application of big data technology in emergency management platform informatization construction

https://doi.org/10.1515/comp-2024-0003
received January 11, 2023; accepted March 20, 2024

Abstract: The emergence of emergencies has impacted China's politics, economy, and other aspects to varying degrees, seriously threatening social stability, economic development, and people's happiness. The emergency management platform plays an important role in the handling of emergencies. The establishment of the emergency management platform can help leaders make correct decisions and reduce the impact of emergencies on the safety of people's lives and property. However, some problems are gradually exposed in the process of establishing the emergency management platform. How to make it play its role better has become an important goal of platform informatization. With the advent of the big data era, big data technology has become a new way of information construction of emergency management platforms. This article mainly discussed the information construction of the emergency management platform. This article proposed to use big data technology to carry out the information construction of the emergency management platform and use the time series data mining algorithm based on the Artificial Neural Network to achieve the prediction function of the platform. The experimental results in this article showed that the prediction rate was 98.0% when the emergencies of the input platform were 50 and 99.0% when the emergencies of the input platform were 300. It can be seen that the emergency management platform designed in this article has a high ability to predict emergencies, so that emergency management measures can be taken in advance to reduce the occurrence of emergencies.

Keywords: big data technology, artificial neural network, emergency management platform, information construction, time series

1 Introduction

The public security of a country is of vital importance. Public security can ensure the stability of people's lives and provide a favorable environment for social development, which is of great significance for maintaining social stability and ensuring national security. It is also a major cause in the process of creating a peaceful society. A safe and stable social environment to maintain for a long time must be the most concerned issue of every country. As a result of the globalization of information technology, the informatization construction of emergency management platform has become a major component of the development of China's security industry. In addition to improving the effectiveness of government emergency management and handling sudden social accidents, the emergency management platform can also play an important role in other areas.

The era of big data has injected new vitality into emergency management. How to realize the informatization construction of emergency management platform under the environment of big data is a top priority. While the process of China's economy, industrialization, and modernization are accelerating, and people's living standards are improving, various emergencies, including social disasters such as work safety, and natural disasters such as earthquakes and tsunamis, are also occurring. As the basic work of emergency management, the emergency management platform plays an important role in preventing and responding to natural disasters, accidents, public health, social security, and other aspects. Big data technology is a new international situation. It provides new opportunities for the construction of an emergency management platform in terms of thinking mode, technology, and management methods.

2 Related work

According to the research on continuous improvement and information construction of emergency management

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platforms, the establishment of a solid emergency management platform is one of the most effective methods to deal with various emergencies. Harrison Sara's research provided the Canadian government with a new perspective on how to solve emergency management problems. Through a series of interviews with people, he outlined the main obstacles and restrictions that the Canadian government must overcome when establishing an emergency management platform [1]. Sahoh Bukhoree said that the main goal of the emergency management platform was to ensure people's safety, but this required extremely accurate and timely information, which made the information construction on the emergency management platform crucial. He used machine learning models to solve these problems, which helped simulate human intelligence and use social media data to adapt to the actual emergency management environment [2]. Atkinson made a comprehensive summary of the emergency management platform used by the government. The emergency management platform was mainly used for emergency preparedness, emergency response, and order restoration. Planning risk management and risk reduction is part of its preparation [3]. The above scholars found that the development of an emergency management platform is crucial, so it is very urgent to find effective information construction methods.

Big data technology can reduce the energy consumption of the emergency management platform, and its rapid response characteristics can improve the overall stability and effectiveness of the platform. The big data technology created by Dagaeva Maria was crucial to the informatization construction of the emergency management platform, which could handle a large amount of spatiotemporal data. Efficient data analysis enabled decision-makers to better grasp the situation. Finally, he evaluated the time efficiency and scalability of big data technology [4]. According to Tidhar Roni, the emergency management platform was used to convey various crisis events that people were experiencing to their superiors and find solutions. He believed that the implementation of information construction of emergency management platform based on big data technology was the best way to quickly and appropriately respond to crisis events [5]. As disasters happen frequently around the world, Chen Ning found that the emergency management platform was a very attractive research field, which was committed to reducing the potential hazards that disasters may bring to people, property, and the environment. The integration of existing resources and the use of observable information are key components of the emergency management platform. At present, big data technology has become more important for efficient platform data processing and intelligent decision-making [6]. The above scholars believe that big data technology plays a crucial role in the informatization construction of emergency management platform.

The research on the informatization construction of emergency management platform for emergencies can effectively enhance the response and response capacity to emergencies and reduce the negative impact of accidents [7]. The emergency management platform helps to improve the level of emergency management, and reduce disasters, so as to promote social stability and sustainable economic development [8]. The construction of an emergency management platform is the foundation of emergency management. A good platform can not only effectively command emergencies, but also ensure the operation of the entire emergency system, and ensure that the operation of the platform is more stable and flexible, which plays a very important role in preventing natural disasters, social security events, and reducing the impact of accidents [9].

3 Information construction of emergency management platform under big data technology

With the rapid development of globalization and information technology, while facing various opportunities, various emergencies are becoming more and more frequent, and these emergencies are becoming more and more harmful. China has a vast territory since ancient times, and disasters have occurred from time to time. In recent years, with the development of China's economy, all kinds of new types of disasters and non-traditional public security incidents have become more and more frequent, and their complexity, harmfulness, and relevance have become increasingly strengthened. Under the background, the super-regional and comprehensive nature of emergencies is becoming more and more prominent, and the relevant departments are paying more and more attention to the emergency management of cities.

The function of the emergency management platform is to communicate with the State Council, and provincial and municipal emergency systems on the premise of meeting the needs of emergency management, so as to achieve the purposes of data reporting, comprehensive coordination, research and judgment, command and control, on-site image collection and remote coordination [10,11]. The emergency management platform must improve public security and the ability to deal with emergencies, and

prevent and reduce the occurrence of public emergencies and the losses caused to the maximum extent, and prevent and reduce the occurrence of public emergencies and their losses to the maximum extent. This ensures the safety of people's lives and property, and maintains the normal operation of society, economy, and politics, thus promoting sustainable social development [12]. The basic structure of the emergency management platform is shown in Figure 1.

As shown in Figure 1, the emergency management platform includes three modules: prevention and emergency preparedness module, risk prediction module, and abnormal management module. The emergency management platform is supported by modern information technology, with software and hardware as the core. It includes risk analysis, early warning and prediction, daily management, comprehensive coordination, etc., and undertakes the execution, command, and decision-making of emergencies [13]. The emergency management platform can not only provide current and past information but also predict future disaster trends, and provide emergency decision-making and intervention measures. The emergency management platform can also formulate corresponding emergency plans and resource allocation plans in a timely manner to ensure the interactivity of various emergency plans and provide convenient tools for emergency management departments and guidance for decision-making.

3.1 Information construction of emergency management platform

By using the characteristics of big data technology, the establishment of an emergency management platform under the big data environment can help overcome the current problems of incomplete, untimely, and dissatisfied emergency management. Secondly, it can conduct emergency management in a timely and effective manner to improve the emergency response capability [14,15]. In addition, the arrival of the big data era enables citizens, governments, and social organizations to truly participate in the governance of emergencies, thus providing new ideas for the development of emergency management. On this basis, the use of big data provides new opportunities for emergency management of emergencies, which is also a new attempt made by relevant departments in the era of big data.

The change in the emergency management concept has brought a lot of data to people. With the increasing number of data, the collection, processing, and analysis of data also make managers abandon their previous experience and seek more scientific and democratic management. Big data technology has a strong data filtering and analysis function, which enables managers to find out the links among the numerous and complex materials, so as to take effective management measures. In short, with the advent of the big data era, people's emergency

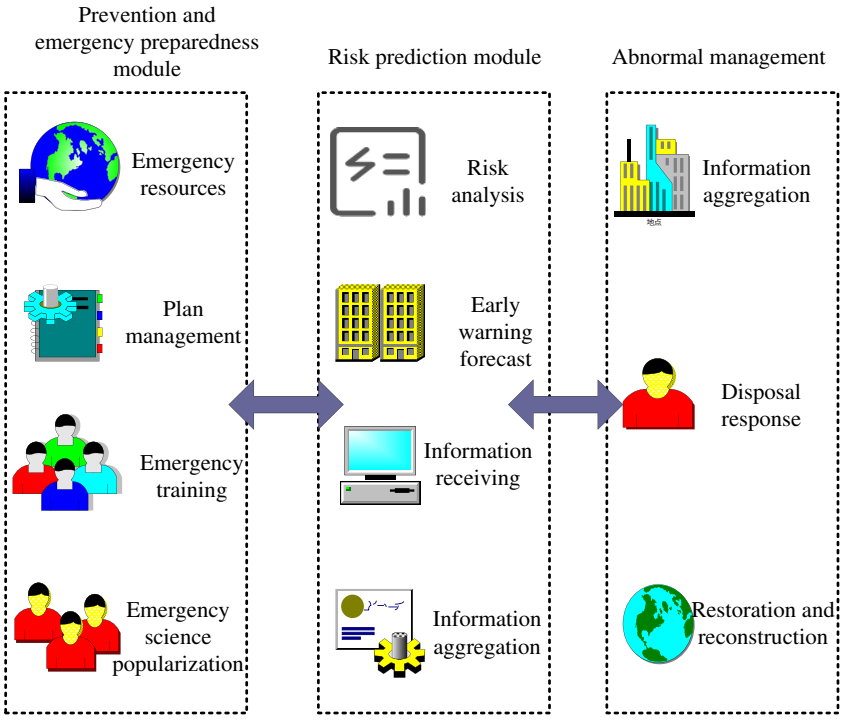


Figure 1: Basic structure of emergency management platform.

management behavior has changed dramatically at all levels, which has a profound impact on China's emergency management. Emergency data based on big data technology are shown in Figure 2.

As shown in Figure 2, emergency data are obtained from data mining tools, data mining models, and data preprocessing in big data technology. Data mining technology is an integrated technology of information technology, database technology, and mathematical statistics technology. Its core is to filter, process, and mine the data in the database to eliminate a large amount of useless information and extract useful data from it. The functions of data mining include data classification, data clustering, data estimation, data prediction, and data association and description.

In the post-emergency management, experts and leaders need to make a lot of analysis and decisions on various emergencies with limited information, which requires the use of non-traditional means. Intelligent decision-making is based on the extensive collection of information related to emergencies, through the establishment of feature base, model base, plan base, etc. The application of modern information technology such as data warehouse and simulation is an effective means to provide decision support services for experts and leaders in the command and dispatching center.

3.1.1 Platform network architecture design

The network communication layer of the platform is mainly responsible for emergency communication. It is an important part of the communication platform, computer network, and other platforms, and also an important link to support the normal work of the platform. The communication platform is connected with wired and wireless communication platforms through standard interfaces and protocols. The emergency management platform is built on the intranet, which can be accessed by relevant emergency departments to serve emergency response, emergency plan management, etc., according to the needs of emergency management. The basic network architecture design of the platform is shown in Figure 3.

As shown in Figure 3, in order to build a command platform, the emergency reporting platform must be improved. The whole platform is composed of many related components and modules. The connection between the components is realized through the interface. The form of these connections is the information exchange between the components. The core idea of the platform is to realize the interconnection and integration with external platforms through a unified access interface and interactive interface. Collaborative work can effectively overcome the shortcomings of each emergency center in dealing with emergencies independently.

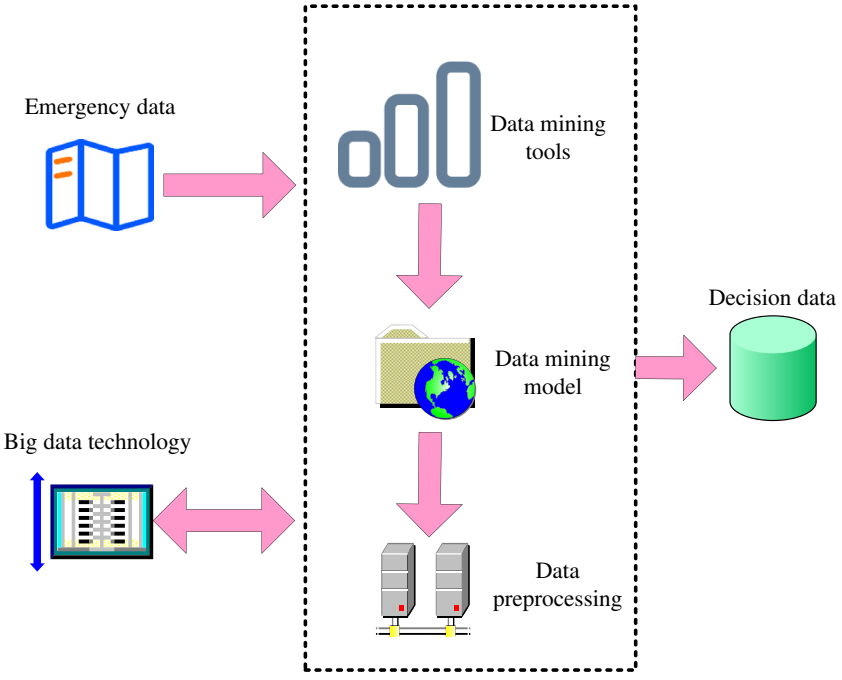


Figure 2: Emergency data based on big data technology.

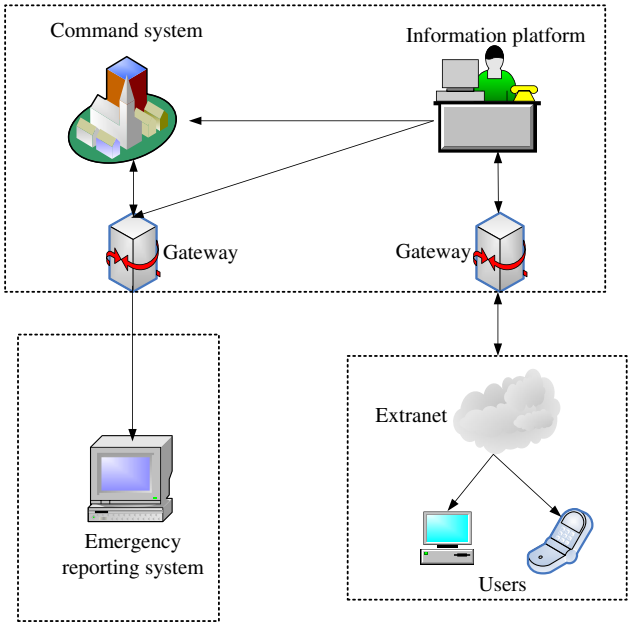


Figure 3: Basic network architecture design of the platform.

In order to improve the performance of the platform, it is very difficult to optimize the application itself. Based on the analysis of the platform, the optimal countermeasures consistent with its needs are developed. Many excellent technologies and methods have been proposed in practical applications. In the design of platform architecture, appropriate technologies and methods can help improve the overall performance of the platform.

3.1.2 Platform risk early warning and prediction design

This article uses big data technology, database, and information technology to improve the existing emergency management platform in combination with the current public security situation and the actual situation of emergency management. An emergency management platform with the functions of risk analysis, information reporting, monitoring and early warning, auxiliary decision-making, comprehensive coordination, summary and evaluation, and post-disaster recovery has been built. Through the platform, the existing emergency resources are integrated to optimize the allocation to the maximum extent and improve the city's emergency capacity, so as to minimize the losses caused by accidents.

Risk information requires detailed information resource demand analysis on the emergency prediction model to ensure the sound and stable operation of the platform. On the basis of collecting a large number of resources and needs, the external support of the community and the interfaces, data, and applications of professional platforms at all levels are comprehensively understood. Information such as all-around and multi-perspective major hazard sources, geographical spatial distribution, and operation status of key protection objects are constructed, and dynamic risk monitoring is carried out to improve the efficiency of timely and accurate reporting. The emergency prediction model is shown in Figure 4.

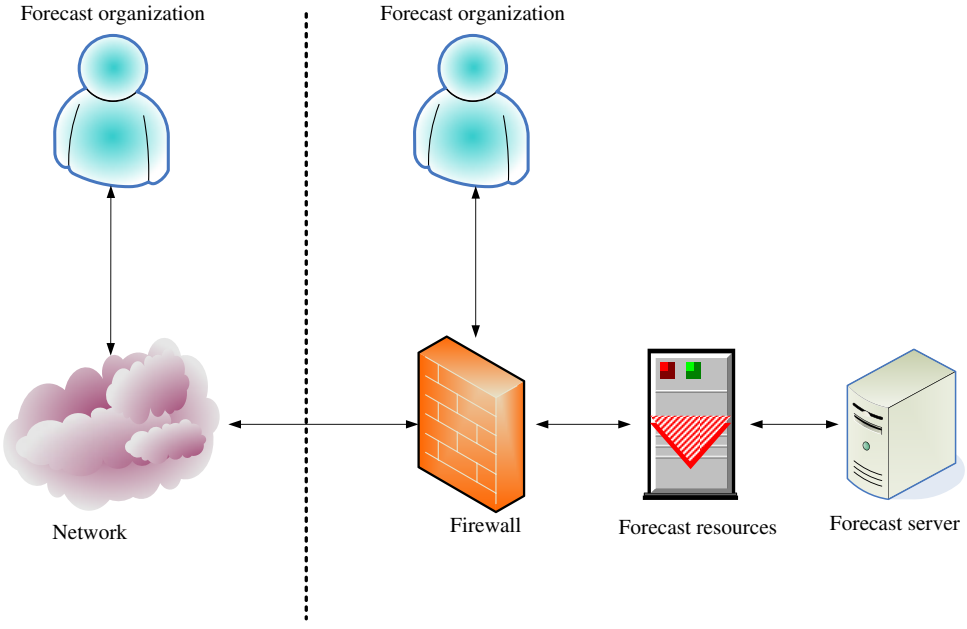


Figure 4: Emergency prediction model.

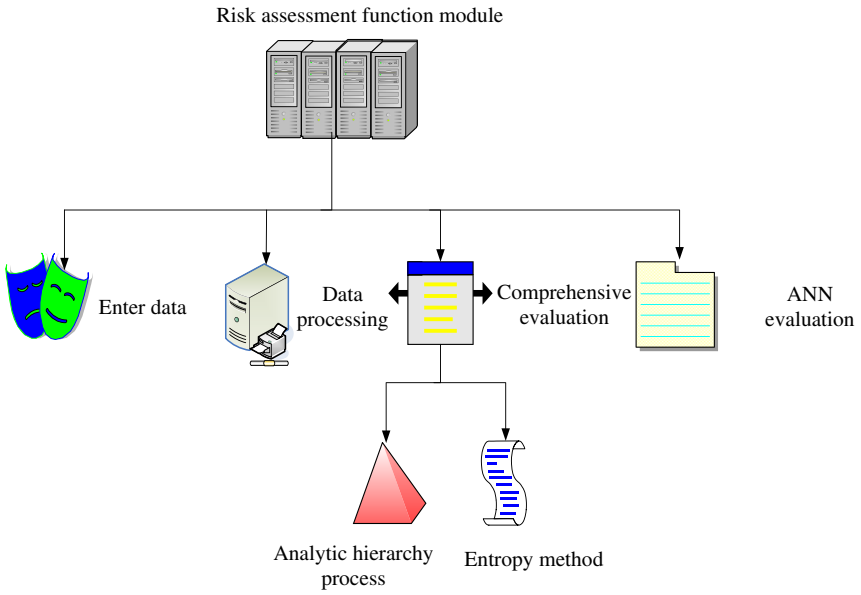


Figure 5: Risk assessment function module.

As shown in Figure 4, the emergency prediction model includes network, prediction organization, prediction resources, firewall, and prediction server. The emergency prediction model incorporates emergency knowledge into the model during data mining. When the results of data mining cannot meet the requirements of emergencies, the data of emergencies are circulated until enough data is obtained to meet the needs of emergencies. The emergency-driven model is changed and the data is reused.

Public emergencies involve many factors and have a large scope of influence. It is difficult to deal with them by only one department or unit. Therefore, relevant government departments must take the lead in coordinating the information and resources of all departments. To achieve cross-regional, cross-departmental, and multi-platform collaborative work, it is necessary to establish a sound emergency command and scheduling system. Through the emergency management platform, the information of various emergency-related sub-platforms can be integrated to present the changes in public emergencies in real time, comprehensively and intuitively, which is convenient for experts and leaders to conduct remote dispatching and command.

3.1.3 Platform risk assessment design

The core of the emergency management platform is to conduct timely and accurate risk analysis and assessment of emergencies. Then, according to the specific situation, corresponding countermeasures are taken. The premise of establishing an emergency management platform is to establish a scientific risk assessment platform, which can give early warning according to the occurrence probability, region, time period, and dynamic changes of event development. Through the analysis of the functional requirements of the risk assessment sub-platform, the main functions of the platform are determined: statistics, analysis, prediction of the original data and dynamic risk trend analysis, and prediction of the lower limit of the risk level that people can withstand. The risk assessment function module is shown in Figure 5.

As shown in Figure 5, the risk assessment function module includes data entry, data processing, comprehensive evaluation, and ANN evaluation, and the comprehensive evaluation also includes analytic hierarchy process and entropy method. When evaluating the risk of emergencies, the comprehensive evaluation method can be chosen, which is a relatively common evaluation method, but its accuracy has a great relationship with the rationality of the weight. ANN has the advantages of learning, memory, association, and so on, which makes nonlinear problems better solved. Since ANN can monitor the classification, sorting, and characteristics of samples, it is unique in algorithm structure, learning speed, and other aspects.

3.2 ANN-based time series data mining algorithm

Time series is a statistical method that depends on experience. It uses random variables in time sequence and has

good stability. However, it cannot show a long-term trend of change, and its prediction result is finally close to a numerical value or a linear function. On the whole, the characteristics of time series are periodic change and non-periodic change.

ANN is a prediction model method with parallel processing, adaptive, self-organization, associative memory, fault tolerance, and robustness. The use of ANN to predict time series can automatically extract effective data from data samples and better describe the function of sampling rules. With the increasing complexity and nonlinearity of functions, the performance of ANN is also getting better and better.

In ANN, the average variance is used to make it converge. In reality, the change in weight is the most critical. Here, the input value of weight Y is shown by formula (1):

$$Y = [y_t, y_{t-1}, \ldots, y_{t-n}]. \tag{1}$$

In the time series model, w_{pij} is used to represent the weight between unit i and unit j. I_{pj} is used to represent the actual value and O_{pj} represents the predicted value.

$$I_{pj} = \sum_j w_{pij} + \theta_{pj}, \tag{2}$$

$$O_{pj} = \frac{1}{(1 + e^{-I_{pj}})}. \tag{3}$$

ANN can approximate any nonlinear continuous function and has strong fault-tolerance ability and fast operation speed. It has a good internal correlation with nonlinear time series and is suitable for prediction. ANN structure includes three layers: input layer, output layer, and hidden layer. The neurons in each layer represent their connection strength by weight and have strong nonlinear mapping ability.

In the input layer of ANN, it is finally output to the output layer by changing the hidden layer. The output tuple I_j of each hidden layer is:

$$I_j = \sum_i w_{ij} O_i + \theta_j, \tag{4}$$

where I_j and O_i represent hidden layer and input layer, respectively. When ANN is used to predict the time series, it indicates that the time series is approximate and can predict n values according to the first $n-1$ values of the time series, as shown in formula (5):

$$A_{m+n} = F(A_n, A_{n-1}, A_{n-2}, \ldots, A_{n-k+1}). \tag{5}$$

ANN can be used to fit and predict the future value. When $m = 1$, it is a single-step prediction. When m is greater than 1, it is a multi-step prediction. At this stage, the obtained prediction results can be used for subsequent prediction, and the prediction rate is an important indicator to measure the offset in classification and prediction.

The update of offset $\Delta\theta_{pj}$ is expressed by formula (6):

$$\Delta\theta_{pj} = (l)\delta_{pj}. \tag{6}$$

The convergence of offset is basically the same as that of the ANN method, but the input of the whole method is slightly different from that of previous methods. Time series data mining is a method to analyse and predict the time series of a specific trend. Under the operation of ANN, a time series is converted into a stable time series, which can be used for fitting.

3.3 Role of big data in the construction of emergency management platform

(1) Improving the intelligence of the platform

Big data can intelligently and efficiently manage the emergency management platform. Smart management is to widely apply big data technology to the emergency management platform. It can improve the rational allocation of rare resources in society and meet the needs of emergency services and emergency supplies to the maximum extent, so as to promote social harmony and stability. Basically, “smart management” is fine management. On the basis of making full use of big data, its efficient use can reduce the cost of emergency management, improve the quality of emergency management, and meet the demand for emergency services more accurately and efficiently.

The core of data management is the openness of big data. If data can be freely circulated in emergency management, the relationship between different management entities, different environments, and different fields can be closer, so as to improve the accuracy of emergency management. Under the influence of the concept of diversified management, the number of participants in government emergency management is increasing, and the channels of participation are becoming wider and wider. A reasonable, effective, and scientific data platform can promote the effective sharing of information in all regions and enable all entities to better respond to emergencies through the induction and analysis of data.

(2) Ensuring the authenticity and effectiveness of platform information

Prediction is the key to big data, which is a typical artificial intelligence, or machine learning. The so-called prediction is to use big data to filter and analyse according to massive data, so as to predict the probability of events. Crisis prediction is a key link in the emergency management

platform and the core of the entire emergency management process. The correctness of crisis prediction directly affects the difficulty of emergency management. Accurate prediction can reduce the loss of accidents and even prevent the occurrence of accidents. Therefore, the accuracy of prediction is directly related to people's lives and property. According to the current data and intelligence related to the emergency, the emergency management personnel make correct predictions of the emergency by applying scientific prediction methods and logical reasoning methods.

Data disclosure can make it a map with a prediction function, and also greatly improve the efficiency of data exchange, disaster recovery, reconstruction and other work. In case of emergency, data disclosure can provide convenience for the emergency management department, because emergencies have the characteristics of emergency and uncertainty, which brings huge difficulties and challenges for rescue workers to take action. The post-disaster recovery and reconstruction project is huge and complex. In the process of handling personnel, the leadership, organization, and coordination of relevant departments and the active participation of the public should be involved.

4 Current situation and countermeasures of emergency management platform

4.1 Development status of emergencies

China has a vast territory, and there are great differences between climate and geographical environment, leading to various emergencies, such as unexpected accidents, natural disasters, etc. China's basic national conditions determine the frequency and danger of such incidents. In addition to natural disasters, with the development of social economy, the occurrence of various social disasters such as safe production and environmental pollution is also increasing. The rapid development of science and technology has also brought new threats to people's lives, and many unexpected events have also increased. To this end, China has issued a series of emergency management policies and measures.

With the development of society, people are facing both opportunities and great challenges. The natural disasters and emergencies that have occurred in recent years have brought incalculable losses to the lives and properties of the people, as well as great threats to public security and the ecological environment. From the current situation, the contradiction between various emergencies and a harmonious society has become very prominent. China is facing a very serious situation in dealing with public emergencies. The growth rate of emergencies from 2019 to 2022 is shown in Figure 6.

As shown in Figure 6, it can be seen from Figure 6(a) that the maximum growth rate of emergencies in 2019 is 6.8%, and the maximum growth rate of emergencies in 2020 is 9.7%. It can be seen from Figure 6(b) that the maximum growth rate of emergencies in 2021 is 13.5%, and the maximum growth rate of emergencies in 2022 is 17.1%. Although the increase is not high, it has been growing steadily. It shows that there are more and more emergencies in recent years, and emergency management has become more urgent.

Although China has issued a series of emergency management laws and regulations, there are still many defects on this basis. Some laws, regulations, documents, and policies have only abstract and general requirements for emergency management. At present, the research and suggestions on emergency management only stay on the theory and guiding ideology, and cannot give specific ideas and methods in practice. The era of big data provides new opportunities for the actual operation of emergency management and puts forward new requirements for emergency management.

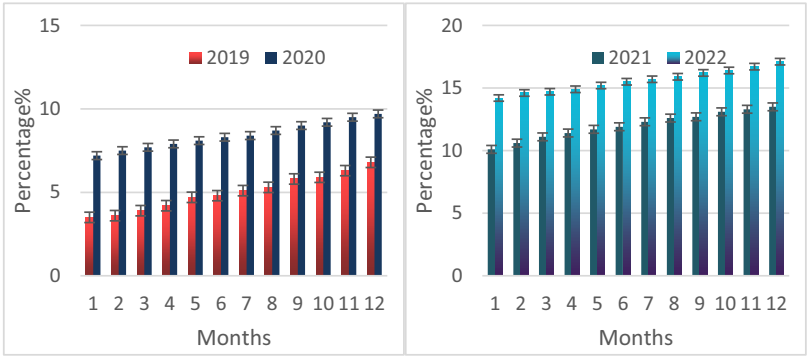
4.2 Problems in emergency management platform

In order to find out the problems existing in the current emergency management platform and propose corresponding solutions, we conducted a survey of 500 respondents in a city. The following is a specific description of the investigators:

Age distribution: The age range of the survey respondents was broad, including people from 20 years old to over 60 years old. This diversity helps to get perspectives and feedback from different age groups.

Occupational background: Respondents came from a variety of occupational backgrounds, including government officials, emergency workers, medical professionals, engineers, students, and ordinary citizens. This diversity helps to gain insights from different areas of expertise.

Level of education: Respondents' education spans all levels, from a secondary school diploma to a PhD. This helps to ensure that the survey results reflect the views of all education levels.



(a) (b)

Figure 6: Growth rate of unexpected events from 2019 to 2022. (a) The growth rate of emergencies from 2019 to 2020. (b) The growth rate of emergencies from 2021 to 2022.

Work experience: The respondents varied in their work experience, including experienced professionals and young people just entering the workforce. This helps to get feedback from different experience levels.

Survey methods: Surveys can be conducted through a variety of methods, including face-to-face interviews, telephone interviews, online surveys, or focus group discussions, to ensure diversity and comprehensiveness of data collection. In order to find out the problems existing in the current emergency management platform and propose corresponding solutions to improve the efficiency of the platform, this article investigates 500 people in a city.

(1) The timeliness of emergency handling by superior departments is not high

In essence, the emergency management platform is a system of overall linkage of all relevant departments, which requires human, financial, and material resources to be concentrated in one department. The functional division of each department is clear. However, there are often problems of duplication and incongruity, which to a certain extent affect the communication and cooperation of each department. Urgent emergencies require the government to gather all resources in the shortest time and react with the fastest speed, which requires the superior departments to deal with the emergencies in a timely manner. The timeliness of the superior departments to deal with emergencies is shown in Table 1.

As shown in Table 1, from the response of 500 people, it can be seen that only 63 people think that in the emergency management platform, the superior departments are very timely in handling emergencies, accounting for only 12.6%; 73 people think the treatment is timely, accounting for only 14.6%; 86 people believe that the treatment is generally timely, accounting for only 17.2%; 126 people believe that the treatment is not timely, accounting for only 25.2%; and 152 people think the treatment is very untimely, accounting for only 30.4%.

Since various departments need to cooperate, it takes a lot of time and energy to coordinate them. The lack of prior contingency capacity makes it difficult for departments to quickly formulate reasonable and efficient response measures. Due to the vast territory of the country, the number of cities, and the low level of cooperation among cities, local governments often act independently in response to emergencies, resulting in a waste of resources and inefficient emergency management. At present, the main task of emergency management is undertaken by the National Emergency Management Bureau. However, as a department with an overall planning function, its power, resources, and other aspects have obvious deficiencies, and it seems unable to cope with emergencies.

(2) People's participation and attention are not high

China's emergency management mainly focuses on improving the emergency management level of the government, while ignoring the social forces outside the government, which leads to the difficulty of ensuring the participation of the masses in the construction of the emergency management platform. From the perspective of the masses, there is weak awareness of participation, awareness of importance, and emergency response capacity in the face

Table 1: Timeliness of handling emergencies by superior departments

Timeliness	Number of people	Percentage
Very timely	63	12.6
Quite timely	73	14.6
Generally timely	86	17.2
Not timely	126	25.2
Very untimely	152	30.4

of emergencies. The participation and importance of the masses are shown in Figure 7.

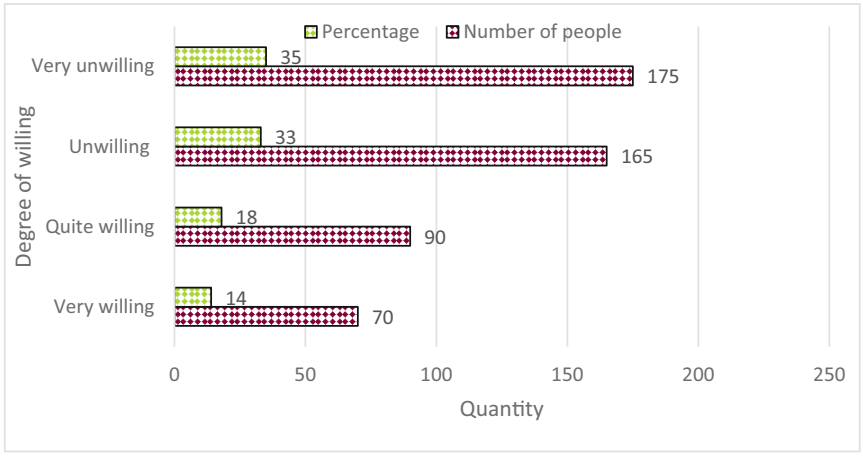
As shown in Figure 7: From Figure 7(a), it can be observed that only 70 people are very willing to participate in emergency management, accounting for 14%. Only 90 people are willing to participate in emergency management, accounting for 18%; 165 people are unwilling to participate in emergency management, accounting for 33%; 175 people are very unwilling to participate in emergency management, accounting for 35%. It can be seen that the people's interest in participation is not high.

According to Figure 7(b), 66 people show that emergency management is very important, accounting for 13.2%; 87 people think that emergency management is more important, accounting for 17.4%. 171 people think that emergency management is not important, accounting for 34.2%. 176 people think that emergency management is very unimportant, accounting for 35.2%.

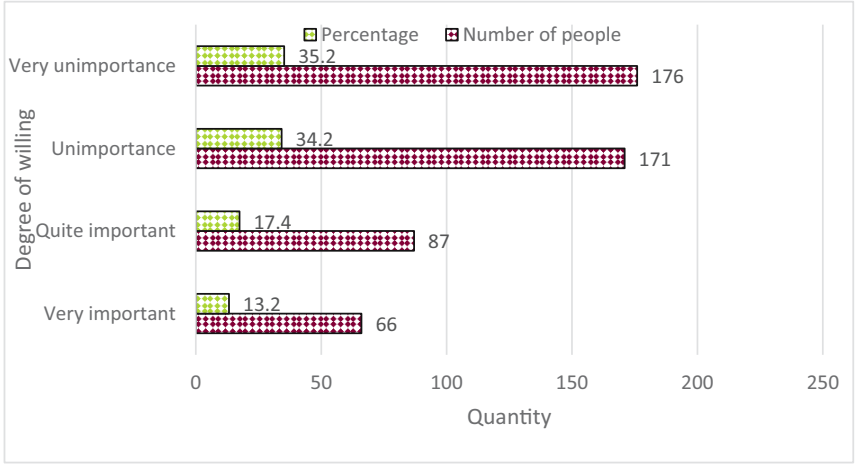
It can be seen that the participation of the masses in emergencies is relatively low, and the emergency management awareness of the masses needs to be further improved. The organization of mass participation in emergencies is not standardized, and the professional service level of volunteers is not high. A good social environment is not formed, and the publicity and education of public safety knowledge are lacking. All these have resulted in a weak awareness of overall emergency management. In crisis management, the power of the masses plays an important role. Therefore, their awareness and ability of emergency management should be strengthened.

4.3 Emergency management platform test

The main objectives of the emergency management platform test are many. The basic purpose of the test is to check



(a)



(b)

Figure 7: People's participation and attention. (a) People's participation and (b) People's attention.

whether the platform has vulnerabilities and business logic; whether the platform is reliable and the response time is up to standard; real-time and predictive ability of data transmission; whether to process massive data quickly; whether the data do not be affected during transmission to ensure the safe transmission of data. Due to limited experience, this article chooses to test the reliability, response time, and prediction ability of the platform.

4.3.1 Reliability and response time test

This article tests the reliability and response time of the designed platform, and selects 120 emergency management data to be processed. It is supposed that two tasks (Task A and Task B) are ordered to complete the processing of emergency management data, in which the reliability is tested by the probability of failure of Task A and Task B, and the response time is tested by the time of task management data. The probability of failure of platform tasks and the time to process data are shown in Figure 8.

As shown in Figure 8, Figure 8(a) shows that the probability of failure of Task A is 0.17 and 0.23%, respectively, when the emergency data volume is 20 and 120, and the probability of failure of Task B is 0.13 and 0.17% respectively when the emergency data volume is 20 and 120. The probability of failure of Task B is lower than that of Task A in these two time periods. However, in general, the probability of failure of Task A and Task B is very low, indicating that their reliability is very high.

In Figure 8(b), it is found that Task A takes 1.4 s when the amount of emergency data to be processed is 20, and 3.1 s when the amount of emergency data to be processed is 120. Task B takes 1.3 s when the amount of emergency data to be processed is 20, and 3.0 s when the amount of emergency data to be processed is 120. It can be found that both Task A and Task B spend little time processing data, indicating that they are very efficient.

The test environment is a common LAN, which is implemented by connecting the client and server together. Through correct domain name configuration and proper analysis, server access is realized.

4.3.2 Predictive ability test

The prediction ability of the emergency management platform is tested, and 300 emergencies are selected for the experiment. The prediction results are shown in Table 2.

As shown in Table 2, when the input platform's emergency is 50, the predicted event is 49, and the prediction rate is 98.0%. When the emergency input to the platform is 300, the predicted event is 297, and the prediction rate is 99.0%. According to Table 2, the prediction rate of the emergency management platform is above 97.0%, which indicates that the prediction ability of the emergency management platform is very strong.

From the prediction results, the prediction results of the platform are good. Through the analysis and exploration of the data, the hidden laws behind it can be found,

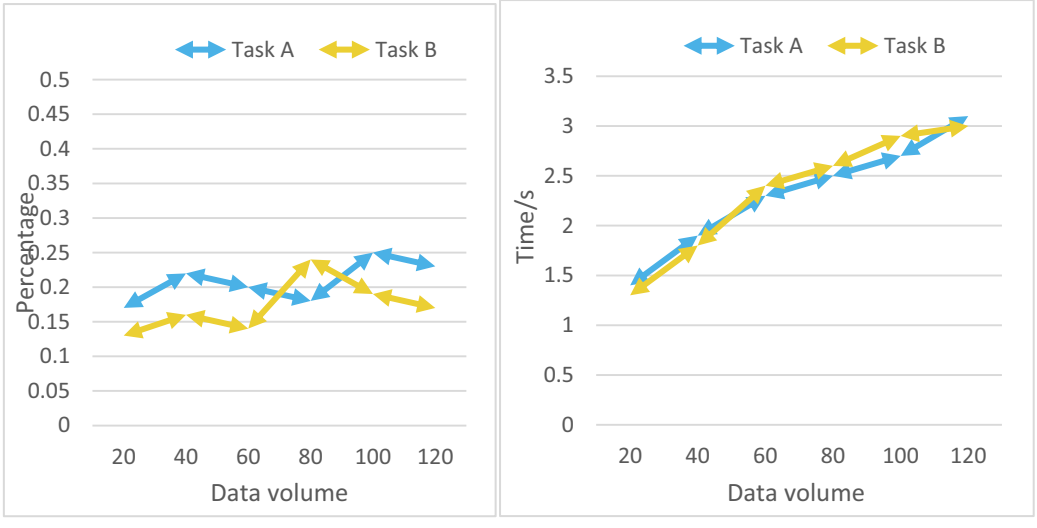


Figure 8: Probability of failure and data processing time. (a) Probability of failure and (b) Data processing time.

Table 2: Prediction results

Emergency	Forecast quantity	Forecast rate (%)
50	49	98.0
100	97	97.0
150	147	98.0
200	199	99.5
250	248	99.2
300	297	99.0

which is very helpful for the prediction of the emergency management platform. The most important information of the emergency management platform is the emergency prediction information. There is an internal relationship between each prediction result and the next prediction result. The prediction effect would be better if the time series analysis method is used to fit the development trend of the platform.

4.4 Measures for informatization construction of emergency management platform

(1) Improving the grass-roots emergency management organization system

It is necessary to strengthen the emergency management of grass-roots organizations, offices, and working institutions. The organization, functions, and funds based on the actual emergency management work should be reasonably arranged. With the government as the main body, a sound and multi-level emergency management platform has been established to enable social organizations to participate in emergency management, thus forming a large-scale emergency management platform with horizontal communication, resource sharing, efficient command and coordination, and complete organizational structure. The emergency meeting system shall be established and improved, and the emergency management committee meeting shall be held regularly. The organization and command of the site are standardized. When an accident occurs, the commander system is implemented to improve the standardization and professionalism of emergency management.

It is necessary to establish a leading group for emergency management in towns (streets), set up an emergency management office, and specify the specific responsible person. At the enterprise level, it is necessary to establish and improve the responsibility system of emergency management. The enterprise leaders should take the lead in establishing the leading group of emergency management and safety production work, and clarify the responsibilities. For enterprises in high-risk industries such as coal mine, dangerous goods production, and oil storage, they should establish emergency management functions and arrange professional personnel for emergency management. Corresponding emergency management organizations should be established in schools and equipped with special personnel to manage the safety of schools.

(2) Strengthening auxiliary measures to ensure the orderly operation of the platform

Big data is fundamentally different from traditional data, and its management ideas and methods are quite different from traditional data management methods. The establishment of correct big data awareness is the basis for realizing big data management. The government should strengthen the management of big data. The government should cultivate the awareness of relevant government personnel and the public about big data from the publicity of big data to enhance the quality of relevant departments and personnel, and form the strategic thinking of big data, so as to change the concept of emergency management to ensure that the right big data awareness and ability are available from top to bottom. The traditional data management idea is based on the needs of a small number of people to meet the needs of most people. With the advent of information technology, the management model based on big data has replaced the traditional data management model.

In the era of big data, various emergency management data and information can be freely exchanged, which is fundamental to improve the efficiency of government services. The network propaganda must be guided by two aspects of strengthening the leadership's ruling ability and building a harmonious society, so as to improve the efficiency of government service. At the same time, the popularization of the emergency management platform should be strengthened, so that the general public can understand the function, work content, data theory, and application of the emergency management platform, and make the general public fully understand the significance and role of the emergency management platform.

The application of big data technology in the information construction of emergency management platforms has important contributions and innovations. Here are some key aspects:

Real-time monitoring and early warning: Big data technology enables the collection, processing, and analysis of large-scale data in real time, including meteorological data, seismic data, social media information, etc. This allows the

emergency management platform to provide a more accurate disaster monitoring and early warning system, so that action can be taken before disasters occur, thereby reducing losses.

Resource allocation and scheduling: Big data analytics can help emergency management agencies better understand the scale and impact of disasters to more effectively allocate and dispatch emergency relief resources. This helps improve the efficiency of relief operations and rapid response to disasters.

Public opinion monitoring and crisis management: Big data technology can monitor social media, news reports, and public opinion so that emergency management agencies can understand the public's response to and needs for disasters. This helps to better manage crisis situations and provide accurate information and guidance.

Risk assessment and planning: Big data analytics can help identify and assess potential disaster risks to better plan the infrastructure of cities and communities. This helps to reduce potential losses and hazards.

Collaboration and information sharing: Big data technology enables information sharing and collaboration between different departments and agencies. This helps to better coordinate rescue operations and reduce information silos.

Intelligent Decision support: Big data analytics can provide decision support tools to help emergency management agencies develop strategies and action plans. This can improve the efficiency and accuracy of decision-making at the management level.

5 Conclusions

While enjoying modern civilization, people are also facing unprecedented ecological environment deterioration and natural disasters. How to scientifically and efficiently improve China's emergency management capacity and level has become a major issue that governments and people of all countries face together. Safety is a major issue related to the work objectives of the Chinese government and the safety of the people. It is of great significance to fully understand the national emergency system and strategic layout, and promote the informatization construction of the national emergency management platform to strengthen the cornerstone of national security. The construction of a scientific and efficient information emergency management platform is an important measure for the government to carry out emergency management in emergency situations. Through the research on the current emergency management platform, this article found out the root cause of the problem and proposed a platform with big data technology as the core based on the characteristics and role of big data technology. In the experiment, the platform designed in this article was tested. However, in the whole process of testing, it is inevitable to be affected by environmental factors. Because the test environment and the actual situation are different, the test results are also different.

Funding information: This work was supported by the Hainan Provincial Natural Science Foundation of China (621RC1084).

Author contribution: The author confirms the sole responsibility for the conception of the study, presented results and manuscript preparation.

Conflict of interest: The authors declare that there is no conflict of interest with any financial organizations regarding the material reported in this manuscript.

Data availability statement: Data sharing is not applicable to this article as no datasets were generated or analysed during the current study.

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