



Enhancing Emergency Rescue Capability in Scenic Areas Using Big Data Technology: A Case Study of Mount Tai Scenic Area

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Abstract

This study takes Mount Tai Scenic Area as a case study to explore how big data technology can enhance the emergency rescue capability of scenic areas. This paper analyzes the methods and means of using big data technology to improve the emergency rescue capability of scenic spots and the shortcomings in the development and design of emergency rescue system. The research findings indicate that big data technology holds significant potential for application in emergency rescue operations in scenic areas, effectively improving the efficiency and accuracy of the scenic area's response to emergencies.

Subject Areas

Big Data Search and Mining

Keywords

Big Data Technology, Scenic Area, Emergency Rescue, Mount Tai Scenic Area

1. Introduction

In today's society, the tourism industry is rapidly expanding, becoming a crucial pillar of various economies. Scenic areas, as core components of the tourism industry, attract a large number of tourists for sightseeing and exploration. However, accompanying issues such as crowded conditions, traffic congestion, and sudden weather changes are increasingly prominent, posing safety hazards. Enhancing emergency rescue capability has become a critical issue that scenic area managers urgently need to address.

As one of China's renowned tourist destinations, Mount Tai attracts numer-

ous visitors annually for mountain climbing and sightseeing. However, due to its rugged terrain and unpredictable weather, the emergency rescue work in Mount Tai Scenic Area faces significant challenges. Traditional emergency rescue methods often rely on manual judgment and single data sources, making it difficult to make timely and accurate decisions, resulting in low rescue efficiency and increased safety risks [1] [2].

In this context, the urgent and necessary task of utilizing big data technology to enhance the emergency rescue capability of scenic areas becomes apparent. With its powerful data processing and analytical capabilities, big data technology can collect and analyze data from multiple dimensions and sources, identify potential emergency risk points, and provide more comprehensive and accurate support for emergency rescue work in scenic areas. Through big data technology, real-time monitoring and analysis of key information such as visitor numbers, visitor distribution, traffic conditions, and weather can be achieved, establishing a more intelligent emergency warning system to provide a more scientific basis for decision-making by scenic area managers.

In the practical application at Mount Tai Scenic Area, big data technology can assist management departments in better understanding the flow of people within the area, promptly identifying areas of congregation and congestion, and predicting potential safety risks. Additionally, big data technology can optimize emergency rescue response mechanisms, enabling rapid and precise dispatch of rescue personnel and resources to enhance rescue efficiency and success rates.

2. Research Methods and Strategies

Research methods and research strategies are key steps in implementing the use of big data technology to enhance emergency rescue capability in scenic areas. In the research using Mount Tai Scenic Area as an example, the following methods and strategies can be adopted:

First, identify the data sources that need to be collected, including internal monitoring systems within the scenic area, visitor movement trajectories, weather data, traffic flow data, etc. These data sources can be obtained through sensors, surveillance cameras, mobile apps, etc. Utilize IoT technology, wireless communication technology, etc., to achieve real-time data collection and transmission, ensuring the timeliness and accuracy of the data. Integrate and clean the data from different sources, eliminate redundancy and noise in the data, and ensure data consistency and accuracy [3].

Analyze the collected data using techniques such as data mining, machine learning, artificial intelligence to discover correlations and patterns among the data. Based on the results of data analysis, establish predictive models and decision models for emergency rescue in the scenic area to predict potential safety risks and optimize emergency response.

Design the big data system architecture for emergency rescue in the scenic area, including data storage, data processing, data analysis, and visualization

display modules based on the results of data analysis and established models. Implement system development and deployment to ensure that the system can monitor key data within the scenic area in real-time and provide timely emergency warnings and decision support. Develop rescue plans tailored to different emergency situations based on the results of big data analysis, including personnel scheduling, resource allocation, traffic management, etc. [4].

Real-time Scheduling and Response: Utilize the big data system to monitor the scenic area in real-time, respond quickly to emergencies, schedule rescue personnel and resources, and optimize rescue efficiency. Establish an evaluation index system to assess the effectiveness of using big data technology to enhance emergency rescue capability in the scenic area, including indicators such as rescue efficiency and reduction in safety hazards. **Continuous Improvement:** Based on the evaluation results, continuously improve system design and rescue strategies to enhance system stability, reliability, and further improve the emergency rescue capability of the scenic area.

Designing an emergency alarm system for a scenic spot requires consideration of multiple aspects, including technology, management, and emergency response. The design process generally includes 10 key steps. First, it is necessary to clarify the needs of the emergency alarm system for the scenic spot, including whether it needs to cover the entire scenic spot, the types of emergency situations that need to be covered, and whether it needs to be integrated with other systems. Based on the needs analysis, select appropriate technical solutions, including sensors, alarm devices, communication devices, and back-end management systems. According to the actual situation of the scenic spot, plan the layout of alarm devices, including determining the installation location, coverage area, and number of devices, as well as planning the communication network to ensure signal coverage and reliability.

The design of emergency alarm system in scenic spots needs to be integrated with other systems. The design of emergency alarm system in scenic spots needs to develop linkage strategies and determine the management mechanism of the system, including regular inspection and maintenance of equipment, preventive maintenance, alarm response process, etc., and establish a sound management system.

The design of emergency alarm systems requires regular emergency drills, and the design of emergency alarm systems in scenic spots needs to consider local laws and regulations. The design of emergency alarm systems in scenic spots requires training for relevant personnel, including the use of the system and the operation process in emergency situations. The design of emergency alarm systems in scenic spots requires the establishment of a monitoring and evaluation mechanism to regularly evaluate the system, including equipment status, alarm response, etc., to ensure that the system can operate stably and reliably for a long time.

By implementing the above methods and strategies, the emergency rescue capability of Mount Tai Scenic Area can be effectively enhanced using big data

technology, providing more scientific and efficient support for safety management in the scenic area. It also serves as a reference for safety management in other scenic areas. Big data technology plays a significant role in emergency rescue in scenic areas, offering more effective support for safety management. In the future, the application of big data technology in safety management in scenic areas can be further improved to enhance the overall safety level of scenic areas [5] [6].

3. Shortcomings and Challenges

In the process of using big data technology to improve the emergency rescue capability of scenic spots, the historical emergency rescue data of scenic spots are deeply analyzed by using big data technology, including the time, place, cause and rescue process of the accident, from which we can find the problems and deficiencies in the emergency rescue work. Through big data technology real-time monitoring the flow of people, traffic and other data in the scenic spots, and timely detection of emergency events may lead to abnormal conditions, such as congestion, traffic jams, and so on, to prevent accidents. By using the technology of big data mining, this paper analyzes the behavior data of tourists in the scenic spot, understands their behavior habits and preferences, discovers the behavior patterns that may lead to the hidden danger of safety, and takes measures to prevent them in time [7].

Using big data technology to carry out emergency drill simulation, simulation of various emergency rescue operations, found in the simulation process of the problems and deficiencies, timely improvement and improvement of the rescue program. To establish a feedback mechanism for emergency rescue in scenic spots, collect the opinions and suggestions of tourists and rescuers, understand their evaluation and needs for emergency rescue work, and find out the existing problems and the space for improvement. Through the above methods, we can make use of big data technology to understand the situation of emergency rescue work in scenic spots comprehensively and deeply, and find out the existing shortcomings and deficiencies, it provides effective reference and improvement direction for improving the emergency rescue ability of scenic spot.

There are many issues and shortcomings in using big data technology to enhance emergency rescue capability in scenic areas. During the process of data collection and integration, sensitive data such as personal information of tourists may be involved, posing risks to data privacy and security, necessitating enhanced data protection and privacy measures. Due to the diverse and massive sources of data, there may be issues with data quality and integrity, such as data missing or errors, affecting the accuracy and reliability of data analysis and modeling. In the process of data analysis and modeling, it is necessary to select appropriate algorithms and models for processing, but there may be situations where algorithms are improperly chosen or parameters are not adequately optimized, impacting the predictive and decision-making effects of the models. The

application of big data technology requires system integration and deployment, which may face challenges in terms of system compatibility, stability, etc., necessitating systematic testing and optimization [8].

Big data technology demands a higher level of expertise from operators, requiring a certain level of data analysis and processing capabilities. There may be issues with inadequate personnel training and technical support, affecting the normal operation and maintenance of the system. In the process of using big data, the following difficulties may arise: the vast amount of data processed by big data technology requires high-performance computing and storage devices to support data processing and analysis, imposing high requirements on hardware facilities and costs. Big data comes from diverse sources, including structured data, semi-structured data, and unstructured data, necessitating the comprehensive integration and analysis of various data processing technologies. Emergency rescue in scenic areas requires real-time monitoring and response, with high demands for the real-time processing and analysis of data, requiring the use of technologies such as stream data processing to achieve real-time capabilities. Big data involves a large amount of personal information and private data, requiring strengthened data privacy protection and compliance management to ensure the legality and security of data processing. Big data technology places high demands on data scientists and engineers, and a shortage of technical talent may affect the advancement and development of big data applications, necessitating enhanced talent cultivation and recruitment [9].

4. Summary and Conclusion

By integrating internal monitoring systems, visitor movement trajectories, weather data, and other data sources within the scenic area, comprehensive collection and integration of various information within the scenic area have been achieved, providing a solid data foundation for subsequent data analysis. Utilizing techniques such as data mining and machine learning, predictive models and decision models for scenic area emergency response have been established, enabling effective prediction of potential safety risks and optimization of emergency response [10].

The architecture of an emergency response system for scenic areas based on big data technology has been designed, successfully developed, and deployed, enabling real-time monitoring of key data within the scenic area and emergency warnings. Rescue plans for different emergency situations have been formulated, and through real-time scheduling and response using the big data system, rescue efficiency and emergency response capabilities have been enhanced. An evaluation index system has been established to assess the system's effectiveness, and continuous improvement of system design and rescue strategies has continually enhanced the stability and reliability of the system.

Taking Mount Tai Scenic Area as an example, research on enhancing the emergency response capabilities of scenic areas using big data technology has

achieved certain results. Big data technology provides a data-driven solution for scenic area emergency response, enabling prediction of emergency situations and optimization of emergency responses through analysis and mining of massive data. By establishing predictive and decision models, intelligent rescue decision-making has been realized, providing scientific guidance and support for rescue personnel, thereby improving rescue efficiency and accuracy.

A scenic area emergency response system based on big data technology has been designed and implemented, enabling centralized management and real-time monitoring of various information within the scenic area, providing more scientific and efficient support for scenic area safety management. The study proposes a path for continuous improvement, including the establishment of an evaluation system and ongoing optimization of rescue strategies, guiding and supporting the continuous enhancement of scenic area emergency response capabilities.

Therefore, utilizing big data technology to enhance the emergency response capabilities of scenic areas is a research field with broad prospects. Through the practice and summary of this research, valuable insights and references can be provided for the safety management of other scenic areas, promoting the continuous improvement of scenic area safety management. It is hoped that future research will delve deeper, continuously improve, and innovate the application of big data technology in scenic area emergency response, providing a safer and more convenient environment for people's travel and daily lives.

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Conflicts of Interest

The authors declare no conflicts of interest.

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