Editorial

Sustainable Emergency Management Based on Intelligent Information Processing

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Abstract: In this paper, we introduce how to identify, rank, evaluate, and respond to risks based on intelligent information processing, providing new ideas and research directions for sustainable emergency management. First, we discuss the contributions and deficiencies of the existing research that have informed the development and launch of this Special Issue and, second, we provide an overview of the three articles included. In addition, this article introduces this particular Special Issue, not only to complement the somewhat lacking body of related literature, but also to help contemporary companies deal with issues related to sustainable emergency management based on intelligent information processing.

Keywords: emergency management; artificial intelligence; information; sustainability

1. Introduction

After several decades of academic and technological development, artificial intelligence technology has penetrated all walks of life, bringing great changes to the development of industry and bringing new experiences to human work and life [1–3]. We have entered the era of big data and artificial intelligence, and with the emergence of digital computers based on the concepts of Turing machines and the von Neumann system, artificial intelligence information processing based on symbolic arithmetic has developed to a great extent, which means that the development of technology has entered a new era [4]. As one of the most important components of artificial intelligence and big data, intelligent information processing can be a useful tool for analyzing, managing, and controlling risks [5]. Its functions include not only massive information retrieval and processing, mining, and integration, but also intelligent data processing such as in risk identification, assessment, and response [6].

The main tasks of emergency management are, in short, twofold: one is to prevent or reduce the probability of accidents, and the other is to deal with the aftermath of an event to reduce the impact and loss caused by the incident [7,8]. Emergency management is the act of carrying out a series of emergency handling and management activities such as evidence-based prevention and early warning, emergency treatment, and emergency rescue. Waugh Jr. and Streib in 2006 studied the organizational structure of emergency management in the United States and the collaborative model of emergency response networks, and emphasized the importance of collaboration in emergency management [9]. Henderson, in 2004, applied the theory of disasters and chaos to emergency management theory to form a

conceptual feature matrix of emergency management theory, which has scientific guidance significance for emergency management practice in many developing countries [10]. In 2014, Gasmelseid focused on the emergency response environment in Saudi Arabia, and studied the applicability of the multi-agent information system through an integrated architecture proposal, with the aim of using intelligent information systems to improve emergency systems [11]. Andrienko and Andrienko in 2007 used intelligent visualization technology to support crisis managers in conducting a situation analysis to find appropriate methods to solve problems and make informed decisions [12]. In 2011, Kahraman, Amailef, and Lu proposed a text information extraction and aggregation algorithm based on smart mobile devices, and constructed a new emergency response system (MERS) framework [13]. That framework is designed to integrate information from multiple sources in the MERS system for emergency situation interactions between governments, citizens, emergency responders, and other non-governmental agencies, thereby providing new opportunities to improve government services during emergencies [13]. The authors also specifically proposed a method for improving the efficiency of decision-makers in emergency situations: the case-based reasoning-ontology method decision support system.

There has been extensive application of intelligent information processing in the management field. An important role of this application lies in its powerful data capture and analysis capabilities, which can enable managers to find potential connections and problems from intricate and fragmented masses of data, and thus prompt the next corresponding management behavior. As Barabási, the authority on international complex network research, believes, in the context of big data, the combined force of data, science, and technology will make humans much easier to predict than expected [14]. Nowadays, most research on emergency management focuses on how the government formulates emergency plans and emergency technology support systems. However, this work usually neglects how to carry out sustainable emergency management in the context of intelligent information processing. The main purpose of the Special Issue of Sustainability on "Sustainable Emergency Management Based on Intelligent Information Processing" is to enrich this sector and provide relevant enterprises and personnel with processing and response strategies.

2. Overview of the Articles in the Special Issue

The Special Issue "Sustainable Emergency Management based on Intelligent Information Processing" consists of several important articles. These are described here.

He et al. collected the panel data of listed companies in 31 provinces, cities, and autonomous regions in China (excluding Hong Kong, Macau, and Taiwan) from 2008 to 2017 from the China Stock Market and Accounting Research (CSMAR) database and the China International Bureau of Statistics website, by using a logistic regression algorithm [15]. This paper explored the spatiotemporal differences of China's guarantee network risk factors, and explored the internal and external factors that affect the guarantee network risk from these two perspectives. The study found that under the current economic situation in China, the upward trend of the number of listed companies' guarantee networks is slow, and this trend is not likely to change in the short term. Second, according to the research results, this article draws conclusions from two dimensions and two levels. From the perspective of spatial scale, the solvency and operating ability of the company are inversely proportional to the possibility of joining the guarantee network, but the profitability will increase significantly; geographically, listed companies in central China demonstrate more consideration of the gross domestic product (GDP) of its province. Meanwhile, from the perspective of time, the solvency of listed companies has a negative impact on the possibility of joining the guarantee network, and the impact increases with time, but profitability has no effect. From a geographical perspective, listing the GDP of the company's province only had a positive impact in 2011 and 2017, and the impact has gradually increased over time.

Aiming to compare safety risks between new projects and projects involving decoration, repair, and maintenance, Li et al. studied the particular phenomena of Hong Kong construction worker generation gaps and extended working hours leading to construction accidents [16]. Based on the

literature on building safety from 1999 to 2019, and using evidence-based practical methods and semi-structured interviews, this study aimed to compare the previous literature and analyze interviews with construction practitioners, court cases, and analytic hierarchy process investigations. The studies showed that construction accidents were not just caused by direct factors that were of concern to the judges most of the time. Moreover, the problem of collaboration between experienced workers and novices is the main cause of construction accidents in new construction projects, and it is often difficult for newcomers to find experienced mentors. At the same time, lax regulations increase safety risks. The study also proposed two new research directions for future developments in population aging and in other high-density, developed cities with long working hours: generation gaps may cause communication difficulties, overtime may lead to accidents, and extremely long working hours can lead to accidents in the workplace.

By investigating the frequent occurrence of accidents on the Bohai Sea, Agbissoh OTOTE et al. optimized the decision-making algorithm for maritime search and rescue schemes, improved calculation methods for probability of containment (POC), probability of detection (POD), and probability of success (POS) models, and increased the search and rescue success rate to a certain extent [17]. After extracting and visualizing the environmental data from the European Meteorological Center, they used the Net Common Data Form (NetCDF) data model to integrate and manage marine dynamic parameter data, while improving the multi-dimensional expression and analysis capabilities of marine dynamic parameters. The concept of density ratio and the use of some form of random detection function were introduced on the basis of the original calculation method, which improved the accuracy of the POC and POD calculations, respectively. The Monte Carlo algorithm, the Graham scanning algorithm, and the minimum rectangle generation algorithm were used to compare the results and showed that the method proposed in the paper by Agbissoh OTOTE et al. could effectively improve the success rate and efficiency of maritime search.

3. Conclusions

In conclusion, this Special Issue on "Sustainable Emergency Management based on Intelligent Information Processing" provides a very useful perspective into artificial intelligence to enrich the current knowledge in sustainable emergency management. It is evident from the articles published in this Special Issue that there are many aspects of sustainable emergency management from the intelligent information perspective that remain to be explored in-depth. Furthermore, these published articles offer potential theoretical contributions and practical implications for the understanding of this field of knowledge. However, it is clear that several key issues regarding the disjunction between theory and practice have not been addressed, and future research could explore these issues, as described in this Special Issue, and seek to bridge the current gaps.

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