AI-Based Safety Production Accident Prevention Mechanism in Smart Enterprises

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ABSTRACT

Enterprises have accumulated a large number of accident data resources for safety production, but the corresponding safety production information processing capacity is insufficient, resulting in the value of massive data not being effectively used, and further restricting the in-depth study of accidents. Enterprise safety managers cannot learn lessons from historical accidents in a timely manner and effectively prevent them, leading to repeated occurrences of similar accidents. Therefore, based on the above problems, this paper aims to construct a mining process for the cause of safety production accidents based on LDA topic model. According to the accident data structure, the article selects a data mining method suitable for its structural characteristics to maximize the utilization of accident data. According to the sequence of initial identification of accident information, discovery of safety problems, and transformation of safety knowledge, the valuable information in historical accident data can be fully excavated so as to provide effective suggestions for accident prevention.

KEYWORDS

1. INTRODUCTION

A smart enterprise is a new management model and organizational form that integrates the new generation of information technology such as big data analysis, Internet of Things, cloud computing, and mobile Internet. It can not only promote the transformation and upgrading of the internal production relations of the enterprise, but also complete the "Internet +" social productivity. The harmonious docking of the company can further release the innovative vitality of the company's employees and provide the company with the source of sustainable development.

Smart enterprise is a human-machine collaborative enterprise that is built on a data-driven basis and presents the characteristics of AI as a whole. Smart enterprises are required to strengthen the construction of the Internet, deepen big data mining, promote management reform and innovation, and deeply integrate advanced information technology, industrial technology and management technology from the perspective of the enterprise as a whole, so as to realize the digital perception and network transmission of all elements of the enterprise , big data processing and intelligent application, so that the enterprise presents a flexible organizational form and a new management model with automatic risk identification, intelligent decision-making management, and self-correcting and upgrading. Safety production is an important part of the development of smart enterprises. With the initial formation of big data for safety production, emerging technologies such as big data and AI will inevitably become the key to promoting the further development of modern safety management or breaking through the

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bottleneck. However, the current safety production field is still in the exploratory stage in terms of safety big data collection, storage, and analysis methods. The data often presents the characteristics of scale, source diversity, and low density of valuable information. Security information processing capabilities are difficult to perform the analysis of massive security or accident data, and the valuable information contained in the data still needs to be further explored and utilized, so as to provide effective suggestions for accident prevention. The continuous improvement of the level of enterprise informatization has provided unprecedented perspectives and information perception capabilities for safety management. At the same time, it has accumulated a large amount of safety information data, which has brought huge "dividends" to safety production supervision, and is more efficient and in-depth prevention. The accident provided an opportunity.

However, despite the fact that enterprises have accumulated a large amount of accident data resources for production safety, the corresponding lack of production safety information processing capabilities has led to the ineffective use of the value of massive data, which in turn restricts the in-depth study of accidents, and enterprise safety managers cannot learn from historical accidents. In time to learn from experience and effective prevention, leading to the repeated occurrence of similar accidents. With the rapid expansion of information resources, production safety data also tends to be diversified and complicated. Compare with traditional structured data, unstructured data such as text, audio, pictures and videos contain more safety accident information, gradually become the main form of recording accidents. However, the amount of these accident data is huge and the structure is complex. At present, its utilization rate is relatively low, and there is still a huge space for mining and utilization. Therefore, how to use AI to efficiently and fully tapping the potential value of the massive accident data to prevent work safety accidents have become a hot topic of current research. However, the current production safety information processing capabilities of enterprises cannot match the increasing amount and complexity of safety information data, traditional data analysis methods can no longer effectively process this information. However, with the rise of AI technologies such as machine learning and data mining, it provides a way to realize deeper mining and analysis of massive accident data.

The main contributions to this paper is We construct a mining process for the cause of safety production accidents based on the Latent Dirichlet Allocation (LDA)topic model.The rest paper is structured as follows. Section 2 introduces related work about data mining and machine learning technologies to classify accident data. In Section 3, text-based accident data mining process is analyzed. The experimental results are reported in Section 4, and make suggestions for smart enterprises in safety production accident prevention, finally Section 5 concludes this paper.

2. RELATED WORK

Timely identification and full understanding of accident information is the key to effective accident prevention. An important reason for the repeated occurrence of accidents is the failure to effectively learn from historical accidents. Many safety accidents have not been reported, or the accidents have been under-reported or under-reported, etc., resulting in these accidents not being given due attention and utilization. Failure to effectively and adequately identify accident information is one of the important reasons for the failure to successfully learn from historical accidents. Therefore, how to fully and efficiently mine and use massive data to prevent accidents has become the key and difficult point for a deeper understanding of the law of accidents, which is also the problem to be solved in this paper.

At present, there have been many attempts to research big data on safety production. In (Jing et al., 2018), based on an improved Human Factor Analysis and Classification System (HFACS) model and statistical analysis method, using 102 accident data from a chemical company, systematically analyzed the multi-level causes of accidents at the organizational level. In (Bellamy, 2015), using the 23,000 safety accidents in the Dutch accident database, the bow-tie model was used to reveal the

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