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Application of Computer Aided Decision Support System Based on Data Mining in Public Management

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Abstract. As a concentrated expression of the public's views and attitudes on issues such as government, enterprises and social events, online public opinion (OPO) has an important impact on public management and social stability. Traditional public management methods and means are often difficult to cope with the complexity and dynamics of OPO, and cannot achieve effective guidance and control. Computer-aided decision support system can effectively control the spread and evolution of OPO in public management. In this article, a prediction model of OPO propagation based on data mining (DM) is proposed and applied to the construction of computer-aided decision support system. The system predicts and analyzes the trend and influence of OPO communication, which provides a more accurate and timely reference for government decision-making. The results show that the computer-aided decision support system proposed in this article has obvious advantages in prediction stability and accuracy. The research results can provide more comprehensive and effective support for public management decision-making and help them better cope with the challenges brought by OPO.

Keywords: Public Management; Internet Public Opinion; Data Mining; Computer Aided Decision Support
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1 INTRODUCTION

In recent years, the growth of OPO presents unprecedented complexity and challenges. With the rise of social media, the spread speed and influence of OPO are increasing, which often forms a hot event of national concern in a short time. There is already a lot of research work underway on data integrity

attack detection in smart grids. Ahmed et al. [1] utilized unsupervised machine learning based covert data integrity attack detection in a smart grid using isolated forests. This method detects whether data has been tampered with by defining a series of rules, but it requires manual rule definition and may not fully cover complex attacks. This method can detect abnormal data by learning normal data patterns, but it requires a large amount of labeled data for training and may not be able to handle new attacks that have not been seen before. Use the isolation forest algorithm to extract features from the preprocessed data. Isolation forest is an unsupervised feature extraction algorithm based on clustering, which can divide data into multiple clusters, each with similar features. In the isolation forest algorithm, each cluster is considered as an independent decision tree, and by ensemble learning of these decision trees, more robust feature representations can be obtained. Moreover, the composition and evolution of OPO has become more and more complicated, involving a variety of factors and stakeholders, making it more difficult to grasp and control OPO. The application range of IoT devices is becoming increasingly broad, from smart homes to industrial automation, from healthcare to environmental monitoring. At the same time, the normal operation and business continuity of IoT devices also depend on the integrity and security of data. In the auxiliary IoT of edge computing, IoT devices need to collect a large amount of data. These data may contain user privacy information, such as location information, lifestyle habits, etc. How to protect user privacy while collecting data is an important issue. When the edge computing node processes data, the user's privacy information may be involved. Alwarafy et al. [2] may infer users' personal preferences, behavioral habits, and other privacy information through analysis of a large amount of data. In the auxiliary IoT of edge computing, data needs to be stored and processed. How to protect user privacy while storing data is an important issue. For example, if a hacker attacks a storage node, it may steal user privacy data from the storage.

As a concentrated expression of the public's views and attitudes on issues such as government, enterprises and social events, OPO has an important impact on public management and social stability. However, the spread of OPO is highly complex and dynamic, and how to effectively control and guide OPO has become a huge challenge in the field of public management. Text mining methods can be used for patent retrieval, technology trend analysis, and technology competitive intelligence, helping enterprises understand patent layout and the technological dynamics of competitors. Through text mining methods, enterprises can obtain product information, market strategies, and consumer feedback from their competitors, providing reference for formulating market strategies. Text mining methods can help policy makers analyze policy implementation, evaluate policy effectiveness, and provide scientific basis for policy formulation. Antons et al. [3] utilized deep learning models such as convolutional neural networks (CNN) and recurrent neural networks (RNN) to perform deep level feature extraction and semantic understanding on text, improving the accuracy of text mining. Through cross language analysis and comparison of texts in different languages, commonalities and differences between languages are discovered, achieving cross language text mining. Identify and analyze emotional tendencies in text through sentiment analysis technology, providing support for market analysis and public opinion monitoring. In the field of public management, OPO has an important influence on government decision-making and social stability. The government needs to pay attention to OPO and understand public opinion and social conditions in time in order to formulate more scientific and reasonable policies and measures. With the rapid development of technology, additive manufacturing (AM) technology has been widely applied in various industries, especially in manufacturing.

AM technology creates three-dimensional objects by stacking materials layer by layer, which has the advantages of speed, flexibility, and customization. However, AM technology still faces many challenges in manufacturing assembly level design (ALD), especially in terms of human related aspects. Auyeskhan et al. [4] introduced a decision-making framework involving human aspects in AM assembly level design based on virtual reality (VR) technology. The decision-making framework based on VR technology provides effective solutions for the human aspects involved in AM assembly level design. By simulating real manufacturing and assembly environments, designers can verify and optimize designs in virtual environments, improve the feasibility and manufacturability of designs, and reduce errors and waste in the manufacturing process. At the same time, VR technology can also

be used to train operators and maintenance personnel, improving their skills and abilities. Traditional public management methods and means are often difficult to cope with the complexity and dynamics of OPO, and cannot achieve effective guidance and control. In medical diagnosis, semi supervised learning can be applied to many scenarios. For example, in medical image classification, partially annotated image data and a large amount of unlabeled image data can be used for training to improve the accuracy of image classification. In addition, in disease prediction and prognosis analysis, some known information of patients and a large amount of historical data can be used for training to obtain more accurate prediction results. Chebli et al. [5] conducted a series of experiments. In the experiment, partially annotated medical image data and unlabeled medical image data were used, and the data was divided into three parts: training set, validation set, and test set. The experimental results indicate that semi supervised learning has a significant performance improvement effect in computer-aided diagnostic systems. Compared to traditional supervised learning algorithms, semi supervised learning algorithms can better utilize the information of unlabeled data, improve the generalization ability and diagnostic accuracy of the model. Especially when the cost of data annotation is high, the advantages of semi supervised learning are more obvious. The computer-aided decision support system based on DM may provide a new solution for the control of OPO in public management.

Computer-aided decision support system can effectively control the spread and evolution of OPO in public management. The purpose of this study is to build a computer-aided decision support system based on DM, so as to control public opinion in public management. Through the in-depth analysis and mining of OPO data, the system can obtain valuable information and knowledge and provide scientific basis and support for government decision-making. Cryptocurrency is a digital currency based on blockchain technology, with its core characteristics being decentralization, anonymity, and security. Since the birth of Bitcoin in 2009, cryptocurrencies have rapidly developed and gradually become a hot topic worldwide. At the same time, the concepts of public management and public value are also receiving increasing attention. Chohan [6] explores the public value behind cryptocurrencies and citizen driven digital innovation from the perspective of public management. With the vigorous development of the digital economy, cryptocurrencies have gradually become the focus of public attention. This article explores the public value behind cryptocurrencies and citizen driven digital innovation from the perspective of public management. The article first introduces the development process and basic principles of cryptocurrencies, and then analyzes the manifestation of public value in the field of cryptocurrencies. Finally, the application prospects of citizen driven digital innovation in public management were discussed. The system will also combine computer-aided decision support technology to provide decision-making consultation, plan formulation, emergency response and other functions to help the government better cope with the challenges brought by OPO.

Multi criteria decision analysis is a method of comprehensively considering multiple factors for decision-making. In cloud service selection, multi criteria decision analysis can comprehensively consider multiple factors such as performance, price, availability, security, etc. of cloud services, providing more comprehensive evaluation and selection for cloud users. Rough set theory is a mathematical tool for dealing with uncertainty and fuzziness. In cloud service selection, rough set theory can process and analyze data, extract features and attributes related to cloud service selection, and provide more accurate and efficient data support for multi criteria decision analysis. Haqiq and Talbi [7] conducted experiments using a real cloud service dataset. The experimental results show that the cloud proxy architecture based on multi criteria decision-making and rough set theory can effectively evaluate and select cloud services, and has higher accuracy and efficiency compared to traditional methods. At the same time, the architecture can also be personalized and customized according to user needs to meet the needs of different users. Its application will help the government to better understand public opinion and social conditions and improve the scientific and rational decision-making. Moreover, the system can also improve the government's ability and efficiency to respond to OPO, and effectively guide and control the spread and evolution of OPO. This will have a positive impact on maintaining social stability and promoting the healthy growth of public affairs. The application of augmented reality (AR) and virtual reality (VR) technology in the field of

architectural design is becoming increasingly widespread. These technologies provide architects and designers with a new way to evaluate and improve their designs. However, although AR and VR technologies are similar in many aspects, they also have some differences in certain aspects. Hartless et al. [8] compared the architectural design evaluation behavior of novices in AR and VR environments. The results indicate that both AR and VR technologies have advantages in architectural design evaluation, but they are suitable for different types of evaluation tasks. AR technology is more suitable for real-world architectural environments because it can provide more realism and interactivity. However, VR technology is more suitable for fully digitized building models as it provides more control and navigation options. The research results of these scholars provide useful reference and support for the application of computer-aided decision support system based on DM in public management. On the basis of traditional research, this article has made the following innovations:

(1) This article studies the use of computer-aided decision support systems based on DM in public management. This system utilizes DM technology to conduct in-depth analysis and mining of OPO, providing scientific basis and support for government decision-making.

(2) This model provides more accurate and timely reference for government decision-making by predicting and analyzing the trend and impact of OPO dissemination, and improves the government's ability and efficiency to respond to OPO.

(3) Through practical applications, the effectiveness and feasibility of the computer-aided decision support system based on DM in OPO control in public management have been verified, providing reference and reference for practical applications in related fields.

This article first introduces the importance of OPO in the field of public management, and proposes to use a computer-aided decision support system based on DM for predicting and controlling OPO; Then, the theoretical and technical basis of the research was explained, and the basic theories of DM and OPO dissemination prediction were introduced; Subsequently, a OPO prediction and control model was proposed in this article, describing the key technologies and methods for system implementation; Subsequently, conduct system testing and analysis to explore the practical application value and potential advantages of the system; Finally, the main research findings and contributions of this article are summarized, and the application prospects and future research directions of this study in the field of public management are discussed.

2 THEORETICAL AND TECHNICAL FOUNDATIONS

With the rapid development of the Internet of Things and blockchain technology, intelligent hospitals have new solutions for remote monitoring and management of patient vital signs. Jamil et al. [9] proposed a blockchain integrity management platform based on the Internet of Things for remote monitoring of patient vital signs, improving the quality of medical services, and ensuring patient safety. In the medical field, monitoring the vital signs of patients is crucial for diagnosis and treatment. However, due to geographical location, resource limitations, and other reasons, many patients are unable to receive timely and accurate medical services. Intelligent hospitals achieve remote monitoring of patient vital signs through IoT technology, but how to ensure the integrity and credibility of data has become an important issue. Blockchain technology can provide tamperproof data recording and transparency. Virtual reality (VR) technology provides new possibilities for the interior design and decoration of office buildings. By constructing a VR based decision support model, we can better meet user needs, improve design efficiency, reduce decoration costs, and achieve sustainable development. Juan et al. [10] provided a detailed introduction to the design concept and implementation method of the model. Through VR technology, designers can simulate and match decorative materials of different materials, colors, and styles in a virtual environment, providing customers with multiple choices and improving decision-making efficiency. Using VR technology, designers can simulate the spatial layout of office buildings, plan space reasonably, improve space utilization, and meet the personalized needs of customers. Through lighting simulation in a virtual

environment, designers can adjust parameters such as the position, angle, and color temperature of lighting fixtures to create a comfortable lighting environment and improve employee work efficiency. With the rapid development of digital technology, the way work, collaboration, and organization are undergoing profound changes in the process of new product development. Marion and Fixson [11] explore how digital tools can influence and change the innovation process, and analyze the opportunities and challenges these changes bring to organizations and individuals. The application of digital tools makes the design and manufacturing processes in new product development more efficient. For example, CAD (Computer Aided Design) software enables designers to create and modify designs more quickly, while CAM (Computer Aided Manufacturing) software can directly convert designs into production processes, greatly improving production efficiency. The application of digital tools has also reduced the cost of new product development. By simulating product design and production processes on a computer, potential problems can be identified and solved in advance, thereby reducing the cost of trial production and modification. Through technologies such as 3D printing, digital tools make rapid prototyping possible. Designers can test and modify products during the design phase, thereby accelerating development speed. In maintenance and repair work, AR technology provides a new way for workers to provide real-time remote support. Mourtzis et al. [12] explore the application of AR technology in real-time remote maintenance support, as well as its impact and potential in this field. Through AR technology, remote experts can communicate and collaborate in real-time with on-site staff to jointly solve problems. AR technology can provide detailed maintenance process guidance for staff, including steps, operating instructions, and precautions. AR devices can collect and analyze device data in real-time, helping staff better understand the device status and cause of problems. Real time remote maintenance support based on AR has broad application prospects in maintenance and repair work. AR technology can help on-site staff quickly obtain guidance and support from remote experts, improving the efficiency and quality of maintenance work. At the same time, AR technology can also reduce costs and improve safety, bringing more convenience and benefits to maintenance and repair work. In the future, with the continuous development and improvement of AR technology, we can expect it to play a greater role in the field of real-time remote maintenance support. Earthquake disasters are unpredictable and highly destructive, posing a serious threat to the safety of life, property, and environment in the region. How to effectively reduce regional earthquake risk under limited economic resources is an important issue currently facing us. In recent years, computer technology and big data analysis have provided new solutions for earthquake risk mitigation. Nuzzo et al. [13] explored how to utilize computer-aided decision-making (CAD) systems to effectively mitigate regional seismic risks with limited economic resources. By establishing an earthquake risk assessment model, quantitative assessment of earthquake risk within the region is conducted, and losses under different earthquake scenarios are simulated, providing decision-makers with an intuitive risk visualization picture. Based on the risk assessment results and combined with the actual economic resource situation, provide targeted earthquake prevention measures and optimization decision-making suggestions, such as building structure reinforcement and community disaster prevention planning.

With the rapid development of technology, augmented reality (AR) technology has been widely applied in many fields. In the manufacturing industry, AR technology provides new possibilities for equipment maintenance and repair. Runji et al. [14] will focus on exploring how AR technology-based maintenance can meet user needs in the manufacturing industry, and analyze its applications in engineering computing and information science. The large amount of data collected through AR technology needs to be processed and analyzed to extract valuable information. This involves engineering calculation methods such as data cleaning, feature extraction, and model building. By utilizing artificial intelligence and machine learning technologies, the collected data can be deeply learned, predicting the status and potential problems of equipment, conducting maintenance in advance, and reducing accident risks. In order to meet the usability and interactivity needs of users, it is necessary to use information science technology for friendly graphical user interface design. In the process of collecting and using user data, it is necessary to consider the security and privacy protection of users, which requires the use of information science technology for data encryption and secure storage. The application of Information Physical Systems (CPS) has made intelligent factories

possible, thereby improving production efficiency, reducing production costs, and to some extent improving environmental impact. However, achieving these goals also requires the manufacturing industry to fully consider sustainability in its design and production processes. Through virtual simulation, the design can be tested and optimized before actual production, thereby reducing the consumption of materials and resources. Salah et al. [15] By optimizing design, energy consumption in the production process can be reduced, thereby improving energy efficiency. Educational institutions should encourage cooperation and exchange between students, teachers, and enterprises in order to apply the latest scientific research achievements and technologies to practical production. Through this approach, we can cultivate a group of engineers with sustainable development awareness to provide more environmentally friendly and sustainable solutions for the manufacturing industry in Industry 4.0. Environmentally sustainable behavior refers to behaviors that minimize the impact on the environment. With the increasing severity of global climate change and resource scarcity, promoting environmentally sustainable behavior has become crucial. Virtual reality (VR) technology, as a new form of multimedia, has the characteristics of immersion and strong interactivity, and can be used to explore new ways to support sustainable environmental behavior. Through VR technology, Scurati et al. [16] created an immersive experience on environmental issues and sustainable behavior, allowing users to deeply understand the importance of environmental protection. VR can provide an interactive experience, allowing users to engage in hands-on environmental practices, such as garbage sorting games and energy-saving device operations. Virtual reality, as a new form of multimedia, has enormous potential to support environmentally sustainable behavior. Through experiential learning, behavior simulation, and awareness enhancement, VR can help users enhance environmental awareness, learn and practice environmentally sustainable behaviors. In the future, we need to further explore and utilize the characteristics of VR to more effectively promote environmentally sustainable behavior and address global climate change and resource scarcity issues.

Magnetic resonance (MR) images have rich texture information, which is of great significance for the diagnosis of diseases. However, due to the complexity and diversity of MR images, manual diagnosis often has significant subjectivity and errors. Therefore, developing a computer-aided automatic diagnosis system is of great significance for improving diagnostic accuracy and efficiency. In order to optimize and classify the extracted texture features, Shanker and Bhattacharya [17] adopted the GBest guided gravity search algorithm (GBest IGSA). The GBest IGSA algorithm combines the advantages of gravity search algorithm and genetic algorithm, and can maintain global and local optimization capabilities during the search process. By using the GBest IGSA algorithm, we can optimize and classify texture features, thereby improving the accuracy of diagnosis. The experimental results show that the automatic computer-aided diagnosis system using texture features and GBest IGSA algorithm has high classification accuracy and can effectively recognize normal and abnormal MR images. At the same time, the system also has good stability and robustness, and can achieve good results on different datasets. Parallel coordinate method is a visualization technique that displays multidimensional data by creating a series of parallel coordinate axes. In virtual reality, this technology can be used to create more complex and accurate 3D models, as well as to update and display relevant data and parameters in real-time. By combining parallel coordinate method with virtual reality technology, Tadeja et al. [18] conducted in-depth analysis and evaluation of engineering projects in an interactive three-dimensional environment. In addition, designers can also simulate different design schemes in a virtual environment, predict potential engineering problems, and better optimize design schemes to improve the quality and efficiency of engineering projects. Designers can simulate and test different design schemes in a virtual environment, compare the advantages and disadvantages of various schemes, and make more reasonable decisions. By simulating various possible engineering problems, designers can predict and evaluate the impact of these problems in a virtual environment, thereby taking proactive measures. IoT devices are widely used in various fields, from smart homes to industrial automation, from healthcare to environmental monitoring. These devices generate a large amount of data, which often contains user privacy information. At the same time, the integrity of data is crucial for ensuring the normal operation of equipment and ensuring business continuity. In the edge assisted Internet of

Things, how to use edge computing to improve data processing efficiency while protecting privacy and data integrity is an urgent problem to be solved. Data integrity can be ensured through data validation. For example, using cyclic redundancy check (CRC) or hash functions to verify data can detect whether the data has changed during transmission. Wang et al. [19] can prevent data from being tampered with by encrypting and verifying data. For example, digital signatures can ensure data integrity while preventing data from being forged or tampered with. Using error correction encoding can detect and correct errors during data transmission. For example, parity codes can correct errors when detected, ensuring data integrity.

3 OPO PREDICTION AND CONTROL BASE ON DM

This section will explore the theoretical basis of the use of computer-aided decision support systems based on DM in public management, including DM, computer-aided decision support, OPO dissemination prediction, and other related theories. DM is a technology that extracts valuable information and knowledge from large-scale data. It discovers potential patterns and association relationships in data through methods such as classification, clustering, and association rule mining. DM theory is one of the important foundations for constructing computer-aided decision support systems based on DM.

In public management, the use of DM technology can help the government better understand public opinion, social conditions, and policy implementation, providing scientific basis and support for government decision-making. For example, through clustering analysis of social survey data, differences and similarities between different groups can be discovered, providing reference for the government to formulate more precise policies; By mining association rules from administrative law enforcement data, problems and shortcomings in the law enforcement process can be identified, providing a basis for the government to improve law enforcement work.

Computer assisted decision support is a method and technique that utilizes computer technology to assist decision-makers in making decisions. It provides scientific and accurate decision support for decision-makers by establishing decision models, conducting simulation, and providing decision consultation. The theory of computer-aided decision support is another important foundation for constructing computer-aided decision support systems based on DM.

In public management, the application of computer-aided decision support can help the government improve the scientificity and rationality of decision-making. For example, by establishing a policy simulation model, the possible effects and impacts of policy implementation can be predicted, providing reference for government decision-making; By providing decision-making consultation functions, it can help the government solve complex problems and improve the efficiency of decision-making.

OPO dissemination prediction is a method of predicting the trend and impact of OPO dissemination through the analysis and mining of OPO data. It reveals the internal laws and influencing factors of public opinion dissemination through emotional analysis, theme extraction, and dissemination path analysis of public opinion data, providing reference for the government's guidance and control of OPO. The prediction theory of OPO dissemination is one of the core theoretical foundations for constructing a computer-aided decision support system based on DM and its application in public management.

In public management, the application of OPO dissemination prediction theory can help the government timely understand the dynamics of public opinion and formulate more scientific and reasonable policies and measures. For example, predicting the dissemination trend and impact of OPO can help the government identify potential public opinion hotspots and risk points in a timely manner, and take response measures in advance; By analyzing the themes and key information of OPO, it can help the government understand the public's attitude and response to policies, adjust and improve policy content.

OPO prediction is one of the important functions of computer-aided decision support system based on DM in public management. Through the analysis and mining of OPO data, we can predict the spread trend and influence of public opinion and provide reference for government decision-making. The OPO prediction algorithm based on DM must first carry out preprocessing operations such as cleaning, de-duplication and word segmentation on the OPO data to extract useful features and information. Then, emotional analysis is carried out on the OPO data, and the emotional tendency and polarity in the text are extracted, which provides emotional information for subsequent prediction. Then, through the theme extraction technology, the theme and key information are extracted from the OPO data, revealing the main content and focus of OPO communication. Figure 1 is a flow chart of a OPO prediction model.

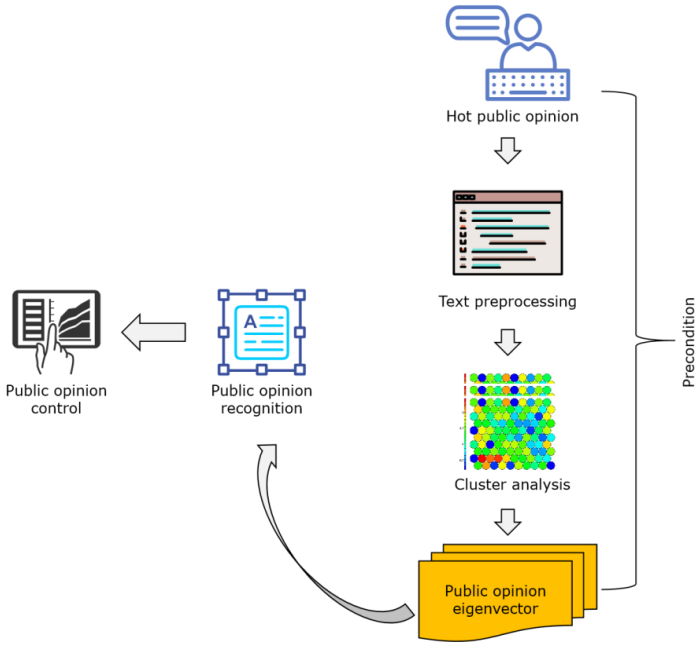

Figure 1: The process of OPO prediction model.

Through the analysis of the propagation path of OPO data, the law and path of OPO propagation are found, which provides a basis for predicting the trend of OPO propagation. According to the extracted features and information, a prediction model is established, and the future OPO is predicted by using historical data. Finally, the prediction results are applied to computer-aided decision support system to provide reference and support for government decision-making.

Through text mining techniques, such as word frequency analysis and keyword extraction, the trigger words related to events in public opinion data are identified. Trigger words usually refer to words or phrases that can represent the occurrence or growth of events. After determining the trigger word, further extract the arguments related to the event, that is, the time, place, subject, object, reason and other related elements of the event. These arguments can provide detailed information about the event and help to understand the nature and characteristics of the event in depth. The extracted trigger words and arguments are labeled with attributes, such as time, place, subject, object, reason, etc. The extracted trigger words and arguments are integrated to form a set of event elements. Moreover, the data are standardized, and the data from different sources and formats are converted into a unified format for subsequent data analysis and model training. The extraction process of event elements is shown in Figure 2.

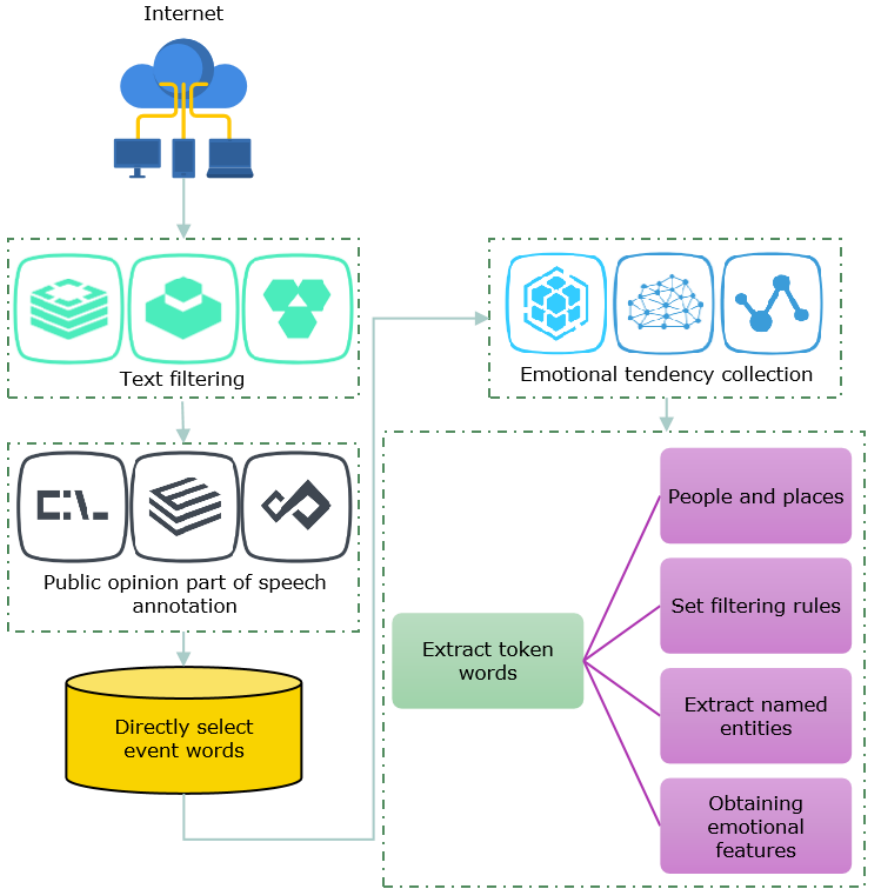

Figure 2: Event element extraction process.

The computer-aided decision support system based on DM is an important tool for controlling OPO in public management. The system architecture adopts a B/S architecture, which is divided into three levels: data layer, mining layer, and application layer. The data layer is responsible for data collection, storage, and processing; The mining layer is responsible for analyzing and mining data, extracting valuable information and knowledge; The application layer is responsible for applying the mining results to decision support, providing functions such as decision consultation, contingency planning, and emergency response. Among them, OPO monitoring and panic analysis is a complex process that requires the combination of various technologies and methods to achieve. Moreover, due to the dynamic changes in OPO, continuous monitoring and analysis are needed to timely grasp the latest public opinion trends and take corresponding response measures. Assuming that there are k neighbor samples in the neighbor sample subset X_i of the sample, the neighbor sample density function is as follows:

$$z_i = \sum_{i \neq j}^{k} \frac{1}{d_{ij} + a}, d_{ij} \leq e_1, i = 1,2,\cdots,numX \tag{1}$$

Among them, a is a small penalty constant in order to process samples with the same value.

Let $X_i = X_i, i = 1,2,\cdots,m$ be the data sample set, where the data sample X_i has the same dimension, all of which are d-dimensional vectors. The result of clustering is to find a reasonable partition $D = D_1, D_2, \cdots, D_k$, and make the partition satisfy the following relationship:

$$\begin{aligned} & X \bigcup_{i=1}^{k} D_i \\ & D_i \neq \varnothing \quad i = 1,2,\cdots,k \\ & D_i \cap D_j = \varnothing \quad i,j = 1,2,\cdots,k, i \neq j \end{aligned} \tag{2}$$

Collect public opinion data related to specific events, themes, or brands from the internet. Remove duplicate, irrelevant, or inaccurate information, clean and preprocess the data to prepare for subsequent analysis work. Use sentiment analysis technology to analyze the emotional tendencies of collected public opinion data. This can help determine the public's views, attitudes, and emotions towards a particular event or theme. Identify key and hot topics that appear in public opinion data through text mining techniques such as word frequency analysis and keyword analysis. By analyzing the transmission channels and speed of public opinion data, understand the diffusion and impact scope of OPO. Evaluate the panic level of OPO based on the results of sentiment analysis, topic recognition, and communication path analysis. The business model for OPO monitoring and panic analysis is shown in Figure 3.

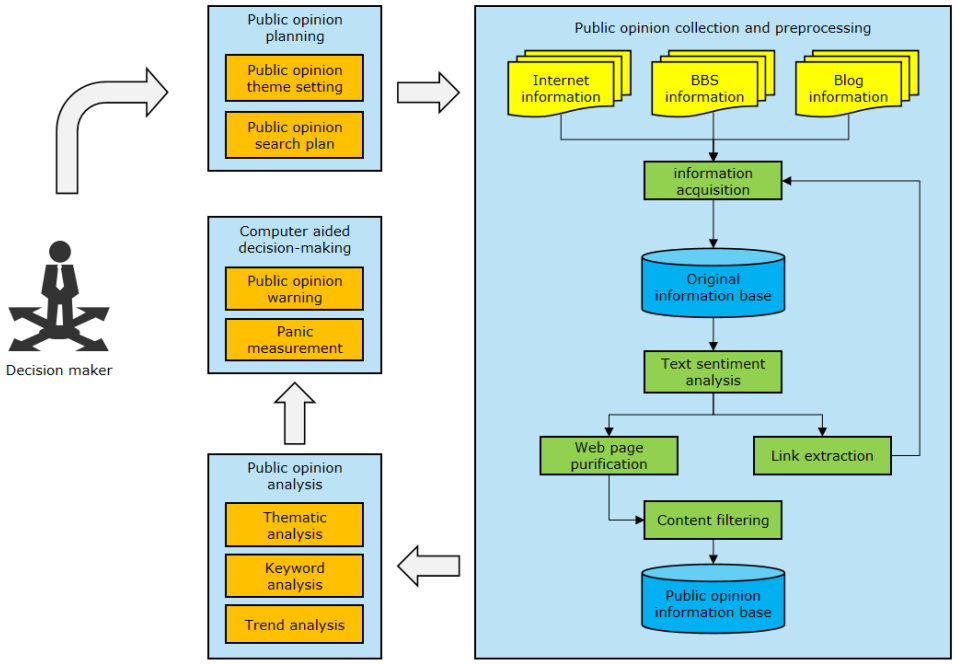

Figure 3: OPO monitoring and panic analysis.

In the construction of the model, the influence of emotional tendency category information of words on them is considered. The value of emotional tendency category of words is related to features f_i and y_{i-1}, while the value of emotional tendency category z_i of phrases is related to features f_i and y_i. Assuming the training set $S = x_i, y_i \,{}_{i=11}^{N}$, the parameter problem is estimated and the feature

weight $\beta = \lambda_k$ is calculated. The following log-likelihood estimation formula is adopted for calculation:

$$L\ \beta\ = \sum_i \log p_\beta \left(y_i\ _{t,c} \middle| x_i \right) \tag{3}$$

If w_p is a positive emotion reference phrase, w_n is a negative emotion reference phrase. The quantity of two groups of reference words is M,L, and the tendency of word W is:

$$Polarity\ w\ = \frac{1}{M}\sum_{m-1}^{M} sim\ w, wp_m\ - \frac{1}{L}\sum_{i=1}^{L} sim\ w, wn_l \tag{4}$$

The smaller the similarity value, the higher the possibility of a new event:

$$Score\ x\ = 1 - \max\left\{ \left(1 - \frac{k}{m}\right) \times sim\ \vec{x}, \vec{c}\ \right\} \tag{5}$$

Where x represents new file information, c_i is the i th cluster in the time interval, i represents the quantity of files contained in the time interval, and k is the quantity of files added between the latest file in cluster c_i and the arrival time of new file x.

Through crawler technology and API interface, OPO data are collected, and processing operations such as cleaning, duplication removal and word segmentation are carried out to extract useful features and information. In the mining layer, the OPO prediction algorithm proposed in this article is realized. Through the analysis and mining of historical data, we can find potential patterns and relationships, extract themes and key information, and predict the spread trend and influence of public opinion in the future. In the application layer, the mining results are applied to decision support. Through the combination with expert system, it provides functions such as decision-making consultation, plan formulation and emergency response. Government decision-makers can use the system to obtain scientific basis and support, and better cope with the challenges brought by OPO.

According to the word segmentation of news reports, use $c_j\ 1 < j < k$ for news topics and $d = x_1, x_2, \cdots, x_i$ for news reports. The probability that d belongs to category $c_j \in C\ 1 < j < k$ is:

$$P\ c_j \middle| d\ = \frac{P\ c_j\ P\ d \middle| c_j}{P\ d} \tag{6}$$

$P\ c_j$ is the prior probability, which is the ratio of the total quantity of documents in class c_j to the total quantity of documents in sample set.

The news report d is divided into the topic class c^* with the highest probability value:

$$c^* = \arg\max_{c_j \in C}\ P\ c_j \middle| d \tag{7}$$

If the two texts D_i, D_j are matrix $m \times n$, take each of m lines as an n -dimensional vector, and then calculate the distance between two of these m vectors. And the Euclidean distance of two n -dimensional vectors $D_i = d_{i1}, \cdots, d_{in}$, $D_j = d_{j1}, \cdots, d_{jn}$ is calculated as follows:

$$d\ i, j\ = \sqrt{\sum_{k=1}^{m} d_{ik}, d_{jk}\ ^2} \tag{8}$$

Each feature constitutes a feature vector:

$$X = x_1, x_2, \cdots, x_{20} \tag{9}$$

The computer-aided decision support system constructed in this article has the following characteristics: (1) Comprehensiveness: the system integrates technologies such as DM, computer-aided decision support, and OPO dissemination prediction, achieving comprehensive control and guidance of OPO; (2) Real time: The system can collect OPO data in real time, analyze and mine it in a timely manner, and provide real-time prediction and decision support; (3) Intelligence: The system has intelligent self-learning and adaptive capabilities, which can optimize and adjust itself based on historical data and actual situations, improving prediction accuracy and decision support effectiveness.

4 SYSTEM TESTING AND ANALYSIS

In order to conduct the experiment, a high-performance computer cluster was first built, including multiple processors and a large amount of memory storage resources. Moreover, experiments were conducted using the Python programming language and related DM and machine learning libraries. Multiple OPO datasets from public management fields were selected for experiments in the study. These datasets include data from social media platforms, news websites, and other public management related data. The experiment aims to evaluate the predictive stability and accuracy of computer-aided decision support systems based on DM in the field of public management, and explore the impact of community identity on the dissemination of OPO. By simulating the model on the MATLAB platform, the predicted stability of the system is shown in Figure 4, and the prediction accuracy is shown in Figure 5.

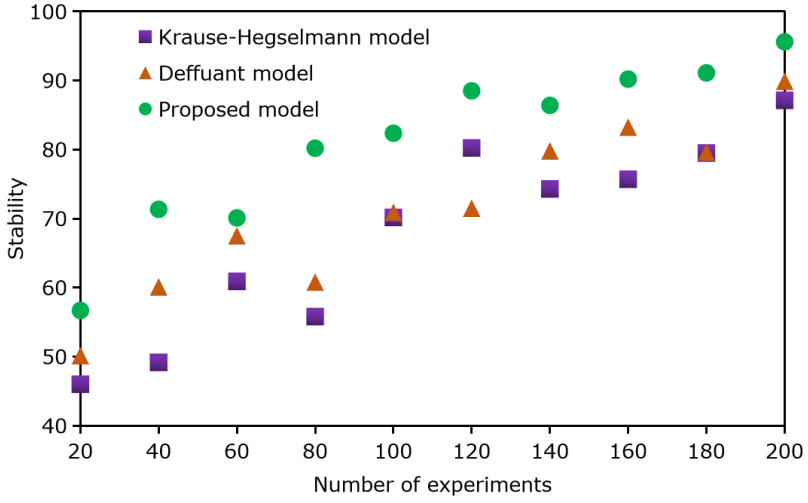

Figure 4: Comparison of system stability.

Figure 4 shows that the predictive stability of the system in this article is higher than the other two models at most time points. This indicates that the system in this article can predict OPO data more stably and is less susceptible to data fluctuations or other factors. Compared with the other two models, the system exhibits good robustness in the prediction process. Even in cases of significant data fluctuations or outliers, the system can still maintain high predictive stability, thanks to its strong adaptability and self-learning ability.

The prediction accuracy of our system is significantly higher than the other two models. This indicates that the system in this article has high accuracy in extracting OPO features and predicting public opinion dissemination trends. By comparing with the other two models, it can be seen that the system in this article can more accurately capture patterns and correlation relationships in the data when processing OPO data.

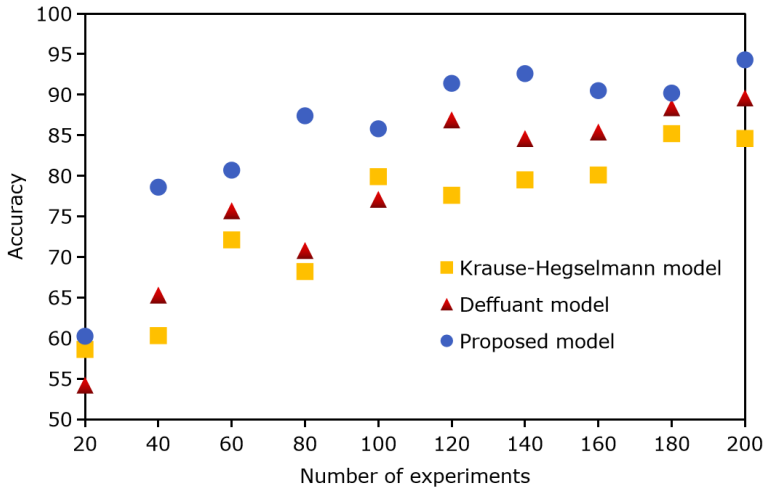

Figure 5: Comparison of system accuracy.

This is thanks to the advanced DM and machine learning algorithms adopted, as well as good feature selection and processing capabilities. In addition, the improvement of accuracy is also related to the good real-time and intelligent performance of the system in this article. Being able to timely capture changes and anomalies in the data, and make corresponding adjustments and optimizations to improve the accuracy of predictions. The results in Figures 6 and 7 demonstrate the role of community identity in the dissemination of OPO.

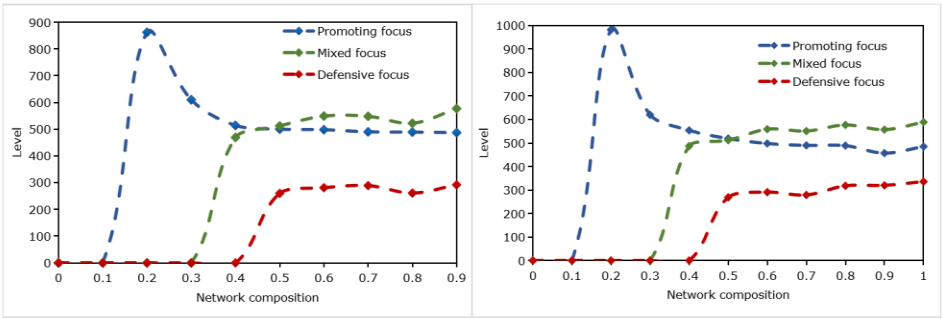

Figure 6: The impact of high community recognition and network composition on the level of OPO dissemination.

When the community identity is high, the network composition has a significant impact on the level and speed of OPO dissemination. When the community identity is high, the connections between nodes in the network become closer, forming a more complete network structure. In this case, public opinion information is more easily disseminated within the community and spreads faster. High community identity means higher trust and interaction frequency between nodes. When public opinion information is disseminated within a community, it is more likely to be accepted and recognized by community members, thereby further promoting the dissemination of public opinion. High community identity helps to form common cognitive and emotional tendencies, making it easier for public opinion information to be amplified and spread during the dissemination process.

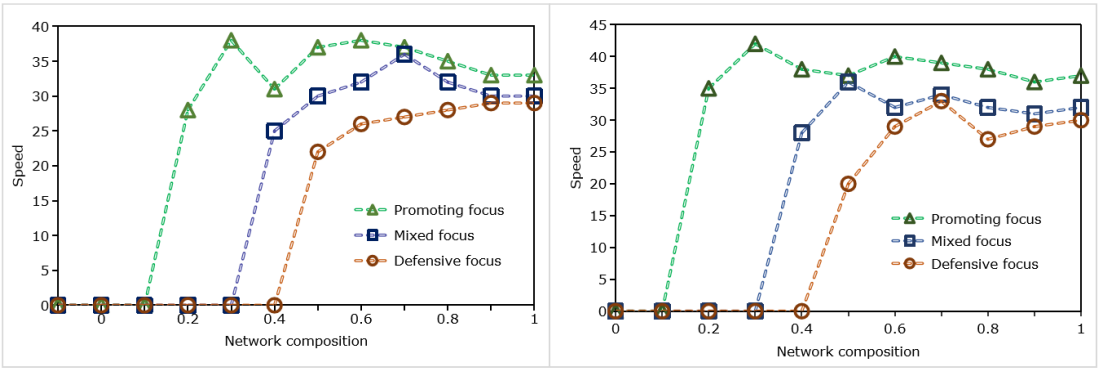

Figure 7: The impact of low community identity and network composition on the speed of OPO dissemination.

In Figure 7, when the community identity is low, the impact of network composition on the level and speed of OPO dissemination is relatively weak. When the community identity is low, the connections between nodes in the network are relatively sparse, and the network structure is relatively incomplete. In this case, the difficulty and speed of disseminating public opinion information within the community will be limited. Low community identity means lower trust and interaction frequency between nodes. When public opinion information spreads within a community, it is more likely to be questioned and resisted by community members, thereby limiting the spread of public opinion. Low community identity may lead to different cognitive and emotional tendencies, making it more difficult for public opinion information to form a unified opinion and emotional tendency during the dissemination process, thereby affecting the effectiveness of public opinion dissemination.

The above results indicate that the proposed system has significant advantages in predicting stability and accuracy. This provides a more scientific and reliable decision support tool for the field of public management, which helps to better respond to the challenges brought by OPO. In practical applications, computer-aided decision support systems can utilize these predicted results to provide decision-makers with more accurate and timely information, thereby helping them formulate more reasonable policies and measures. In addition, the results also indicate that community identity plays a crucial role in the dissemination of OPO. High community identity can help improve the level and speed of OPO dissemination, while low community identity may limit the effectiveness of public opinion dissemination. This discovery has important guiding significance for the construction of computer-aided decision support systems in public management. In practical applications, the system can adopt corresponding strategies to guide and manage the dissemination of OPO based on the identification characteristics of different communities.

By comprehensively utilizing technology such as DM and machine learning, the system can provide more scientific and reliable decision support tools, helping public managers better respond to the challenges brought by OPO. Moreover, based on the identification characteristics of different communities, the system can also adopt corresponding strategies to guide and manage the dissemination of OPO, providing more comprehensive and effective support for public management decision-making.

5 CONCLUSIONS

OPO, as a concentrated reflection of the public's views and attitudes towards issues such as government, enterprises, and social events, has a significant impact on public management and social stability. Traditional public management methods and means often find it difficult to cope with the complexity and dynamics of OPO, and cannot achieve effective guidance and control. Computer

assisted decision support systems can effectively control the dissemination and evolution of OPO in public management. This article studies the application of computer-aided decision support systems based on DM in public management, and explores the role of community identity in the dissemination of OPO. Through experimental simulation, the predicted stability and accuracy of the system were obtained, as well as the impact of community identity on the dissemination of OPO. The results show that the computer-aided decision support system proposed in this article has significant advantages in predicting stability and accuracy. This indicates that the system can provide more scientific and reliable decision support, thereby helping decision-makers formulate more reasonable policies and measures. High community identity can help improve the level and speed of OPO dissemination, while low community identity may limit the effectiveness of public opinion dissemination. This discovery has important guiding significance for the construction of computer-aided decision support systems in public management. In practical applications, the system can adopt corresponding strategies to guide and manage the dissemination of OPO based on the identification characteristics of different communities.

For computer-aided decision support systems, future research can explore more DM and machine learning algorithms to improve the accuracy and stability of predictions. Moreover, more public management data can be combined, such as social media and government reports, to provide more comprehensive and timely decision-making support. Regarding the role of community identity in the dissemination of OPO, future research can further explore how to quantify community identity and analyze its dynamic impact on the dissemination of OPO.

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