WILEY | Hindawi

Research Article

Research on Application of Multimedia Information Technology in Modern Social Governance Platform

Shun Lyu (iD)

Faculty of Business, Shunde Polytechnic, Foshan 528000, China

Correspondence should be addressed to Shun Lyu; 11033@sdpt.edu.cn

Facing the impact of MIT (Multimedia Information Technology) on modern SG (Social Governance) and its opportunity, we should promote the diversified development of SG by cultivating social democratic consciousness in MIT and promote the transparent development of SG by encouraging citizens' right to know. Combining the internal logic of MIT innovation SG with the status quo and opportunities of MITSG, this paper actively explores the application of MIT in modern SG platform and realizes the steady progress of SG capability modernization. Oversampling and density are used to determine the initial K value and initial center point of K-means algorithm, and parallelization improvement is made based on Hadoop platform. Experiments show that the improved K-means algorithm has good parallelism.

1. Introduction

In recent years, the party and the state have attached great importance to SG (Social Governance), and the understanding of SG has been continuously enriched and developed, and the SG system with Chinese characteristics has become increasingly sound [1]. It can be said that MIT (Multimedia Information Technology) in our time is profoundly affecting people's lifestyles and communication forms and also profoundly affecting the interaction between government and citizens, government and network, and citizens and networks in SG [2, 3]. This is MIT era of explosive growth of information. It is an important proposition of the times to rely on MIT to accelerate the digitalization of SG and build a SG pattern of coconstruction, cogovernance, and sharing. As a resource, thinking, and technology, MIT can effectively promote the continuous progress of SG system and governance capacity, from traditional subjective governance to rational scientific governance, and promote the realization of digital SG [4].

With the improvement of people's living standards and their desire to live and work in peace and contentment, further strengthen integrated management innovation, strengthen the social security prevention and control system

by means of scientific and technological informatization, actively adapt to the new situation, implement the new SG concept of coconstruction, cogovernance, and sharing, and improve the modernization level of SG [5, 6]. Modern SG platform relies on computer science and MIT means to unify the management services related to various fields of urban life, such as politics and law, social security, investigation of letters and visits, people's livelihood services, and urban management, under one platform, and realize efficient and convenient management in various fields such as population, family planning, people's feelings, economy, production, and life [7]. Science and technology support and democratic consultation are included together. On the basis of emphasizing the improvement of the intelligent level of SG, science and technology are clearly promoted to the supporting role of SG system, which points out the direction for the application of modern science and technology marked by MIT in SG [8].

Science and technology have never influenced the world as deeply as today and become the most important force to promote economic and social development. As a new information transmission platform, MIT not only relies on TV, radio, and other media forms but also takes network media, mobile phone media, and print media as its important

content. The traditional SG model mainly focuses on "management" under the government's leadership, with "control" as the means to carry out SG in different departments and levels. The modern SG is coconstruction, sharing, and cogovernance, which is a governance structure in which multiple social subjects participate in sharing together through the Internet, in order to carry out precise governance, comprehensive governance, and intelligent governance and facilitate the government to serve the masses to maximize social public interests [9, 10]. This paper analyzes the application of MIT in the modern SG platform and presents these potentially useful contents by visual means, so as to provide theoretical basis and suggestions for optimizing the management configuration of cities, improving the efficiency of municipal service management and the decision-making of municipal departments.

2. Related Work

The achievements made by China's SG since the reform and opening up are obvious to all, and the theories put forward around SG are also very rich, but the SG theory has never formed a complete system [11]. Literature [12] integrates a variety of social methods into the analysis of public affairs' governance. Its core content is autonomy of governance, opposes centralization of power, and emphasizes that public affairs should be jointly managed by multiple powers or services. Literature [13] summarizes several basic modes of state governance, namely, bureaucratic organization and market and policy network, among which policy network is the most critical one. Because government departments have common needs in capital, talents, and technology, they combine to form a brand-new community of interests. Literature [14] advocates that the government should fulfill its duty of serving citizens and decentralizing power to citizens in the process of implementing public management and emphasize the realization of common SG goals through dialogue and consultation between the government and the people. Literature [15, 16] focuses on criticizing many drawbacks and shortcomings of welfare state from the aspects of economic development, financial difficulties, and government expansion and puts forward the theory of reforming welfare state. Literature [17] puts forward the new public service theory, which emphasizes the dialogue and communication between the government, communities and citizens, and civil society and citizenship and emphasizes that the government should establish a mechanism for expressing citizens' interests. Literature [18] holds that the emergence of nongovernmental self-governing organizations not only restricts the government's behavior but also builds a bridge between the government and citizens and plays an important role in influencing the government's decision-making and reform. Literature [19] points out that governance is the principle of how the government defines its role and how to use market methods to manage public affairs under the condition of market economy.

Modern city, as the inevitable outcome of the high concentration of human activities, is a space where human civilization, society, economy, and culture are highly concentrated, and it is an open and complex large system. This open complexity leads to the complexity of modern city

management. Literature [20] discusses the reliability theory of dynamic monitoring of geographical conditions and points out that reliable spatial data digging technology is one of the most important technologies in monitoring geographical conditions. Literature [21] designed a multielement user location reasoning method to deal with user content on Twitter, so as to provide auxiliary data for emergency response. Literature [22] used BP neural network to build a model and analyze and forecast the development trend of haze weather. In literature [23], by establishing a decision tree, the future development is predicted by using the existing information. In literature [24], understanding users' behaviors through mining technology makes communication with customers more effective, which is conducive to establishing a stable relationship between banks and customers. Literature [25] deals with the track data of urban taxis in time sharing and segmentation and analyzes the travel rules of residents in different areas of the city at different times, so as to obtain the commuting situation of citizens in the whole city. With the advent of MIT era, how to extract useful information from massive data from various sources has become a research hotspot at home and abroad.

3. Research Method

3.1. Information Extraction of Social Comprehensive Management Events. In modern SG, some departments lack MIT thinking, MIT governance platform access enthusiasm is not high, interdepartmental information collaboration faces significant resistance, and data sharing mechanism is not perfect, which leads to insufficient utilization of resources, insufficient application, inability to meet the diversified needs of SG, and difficulty in improving the modernization ability of SG.

The national governance system and governance capacity building is a comprehensive systematic project, which can be said to be a revolution in the field of national governance in a certain sense. How to strengthen innovation in the grassroots governance model as the basis of governance needs to be carefully studied and explored. With the development of MIT, the subdivision of business fields and the continuous improvement of the requirements for the modernization of SG, the construction of video and image information projects should improve the front-end intelligence. First, it conforms to the trend of cloud edge and reduces the dependence on background processing; second, improve the reliability requirements, reduce the investment of system operation and maintenance costs, and learn from the unattended and operation and maintenance-free equipment routes of telecom operators as much as possible. Furthermore, the investment effectiveness can be effectively guaranteed by the way of first pilot and then full deployment.

Rule of law is the dominant mode of modern state governance, and system is the basic guarantee of SG. To promote the modernization of governance, all systems must be reformed, mechanisms, laws, and regulations that do not meet the requirements of practice, learn from the advanced governance experience of other countries, innovatively construct a governance system with Chinese characteristics, and

provide a steady stream of impetus for the modernization of the national governance system. Encourage people to participate in policy formulation and supervise the implementation process and provide a good external environment for the development of SG subjects. On the one hand, this can improve people's enthusiasm for participating in SG and prevent illegal administrative acts to a greater extent; on the other hand, it can exercise people's awareness and ability to participate in SG rationally and orderly.

It can be said that the SG system without MIT support is not a scientific and perfect system, and the SG without MIT support is not a modern SG. Although the application of MIT in SG has made some progress, on the whole, the integration of MIT and SG is still in its infancy, and there is a serious problem of insufficient and unbalanced development. In response to the needs of the information age, deepen the understanding of the new changes in the SG concept, pay more attention to the application of MIT in SG, further enhance the ability to use information, and take stronger measures to promote the application of MIT in the field of SG (Figure 1).

The attribute features of events describe the nonspatial and nontemporal characteristics of events. In this paper, they are artificially divided into important attribute features and nonimportant attribute features. The important attribute features refer to those fields that contain important information and make outstanding contributions to the overall expression of events, while the nonimportant attributes refer to those auxiliary new information.

Social comprehensive event ontology provides semantic knowledge of the relationship between event types and types and between types and entities, which is the theoretical basis of ontology reasoning mechanism. Jena is an open source program development framework, which is mainly used to build semantic web application system. Reasoning machine is the core function of ontology. Jena provides a rule-based reasoning subsystem, which can identify and deal with ontology reasoning rules described by OWL (Ontology Web Language) and RDFS (Resource Description Frame Schema). When creating a model, it associates the model with the reasoner to realize reasoning.

The technical core of social management data extraction based on semantic reasoning is the construction of reasoning engine. The reasoning system is based on Jane framework and written in Java language. Combining the ontology relations described by OWL, an ontology reasoning engine supporting semantic reasoning is constructed.

Hot event extraction process: input hot events, such as "contradictions and disputes"; traverse the database and extract the description text of the event; with the support of ontology reasoning engine, match hot events with each piece of data, and output all matching results.

3.2. Information Mining Method in SG Platform.

MIT is an important way to realize digital SG. From the macro point of view, by constructing the corresponding governance system and analysis model through MIT, multidimensional analysis and detailed analysis of the development trend of all walks of life and social sentiment can provide detailed

and reliable data support for SG policies. From the microscopic point of view, polishing the precise algorithm, dynamically tracking, and comparing the massive data can find problems in time and effectively and solve them scientifically and accurately.

Set up a public decision-making and affairs advisory committee between the government decision-making level and the grassroots people to communicate and coordinate the relationship between the government and the people. The advisory committee is neither an administrative institution nor a social consultation and research institution. As a think tank and advisory team of the highest decision-making level of district committees and district governments, its main functions are to communicate between the government and society, connect knowledge and public power, and play the role of a bridge and link between the government and the people. Gradually straighten out the relationship among various governance subjects, and clarify the SG responsibilities of party committees and governments, social subjects, community organizations and the public, which not only improves the administrative performance but also broadens the channels of public participation, strengthens the function of social autonomy, and truly forms a new pattern of local governance with party committee leadership, government responsibility, social coordination, citizen participation, and legal guarantee.

The spatial distribution analysis of social comprehensive hot events is aimed at exploring the high-frequency and low-frequency areas of events, so as to redeploy staff, invest more manpower in dense areas, and reduce manpower in low-frequency areas for the next stage of social management tasks of management departments. The calculation of the kernel density at the random point x in the research space is shown in

$$f(x) = \frac{1}{n} \sum_{i=1}^{n} K\left(\frac{x - x_i}{h}\right), \tag{1}$$

where $h > 0$ is the bandwidth, a smoothing parameter, $x_1, x_2, \cdots, x_3$ is the set of all points in space, $(x - x_i)$ is the distance from this point to other points x_i, and $K()$ is the kernel function.

The kernel functions used are as follows.
Quadratic function:

$$\frac{3}{4}\left(1 - u^2\right), |u| \leq 1. \tag{2}$$

Gaussian function:

$$\frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{x} u^2\right). \tag{3}$$

Compared with simple density analysis, the feature of kernel density estimation is that the values between pixels are smooth. Smaller bandwidth tends to make the density map sharper, while larger bandwidth makes the density change more gentle, covering up the structural characteristics of density. When using kernel function estimation for
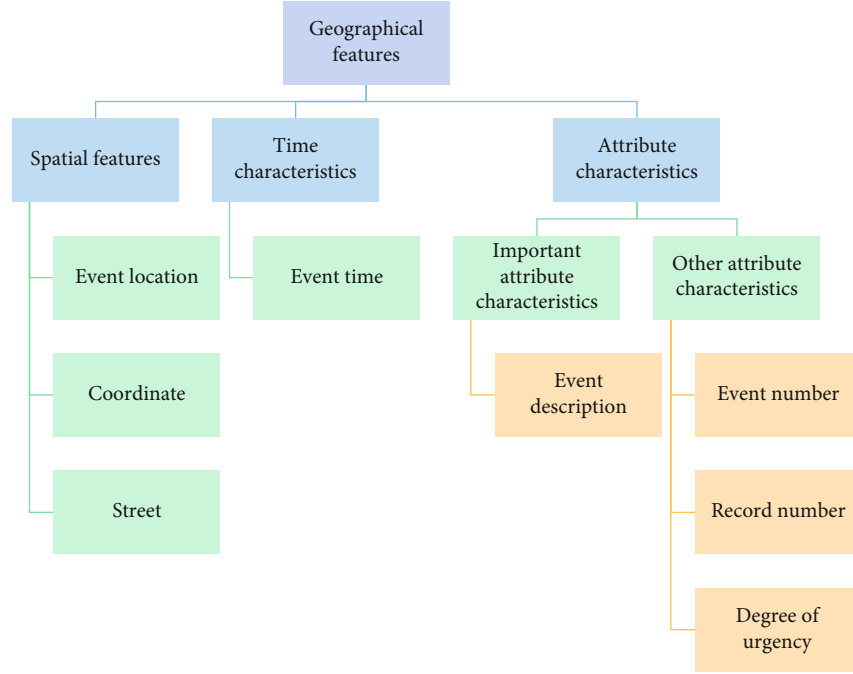
FIGURE 1: Geographical characteristics of social events.

density analysis, it usually takes many experiments before a more suitable bandwidth value can be determined.

When K-means algorithm is faced with MIT, the number of operations increases, and the time for calculating similarity becomes very time-consuming. Therefore, it is essential to adopt parallel computing in the case of MIT. According to the defect analysis of K-means algorithm, this paper proposes SD-K-means (improved K-means based on sampling and density) algorithm.

The initial k value and center point are determined by sampling and density, which solves the defect that users need to specify k value and initial center point in the initial stage.

The convergence condition of K-means algorithm is usually the square error criterion, which is defined as

$$E = \sum_{i=1}^{k} \sum_{p \in C_i} |p - m_i|^2. \tag{4}$$

E is the sum of squared errors of all objects, p is the space point, and m_i is the average of group C_i.

Under MIT, the calculation time of square error cannot be ignored, and this criterion is not suitable for convergence under MIT. In view of this situation, the convergence condition is modified to be the distance between two clustering centers. It is defined as

$$E = \sqrt{\sum_{i=1}^{k} |p_i - p_i'|^2}. \tag{5}$$

p_i is the center point, and p_i' is the new center point corresponding to p_i after primary clustering.

In the user-based CF (collaborative filtering) algorithm, it is a crucial step to calculate the similarity between users or projects. In the user-item matrix R, users are represented as one-dimensional vectors, and the similarity between users can be represented by cosine values of these two vectors. The cosine value is $[0, 1]$, and the larger the cosine value, the higher the similarity. As shown in

$$w_{i,j} = \cos\left(\vec{i}, \vec{j}\right) = \frac{\vec{i} \cdot \vec{j}}{\left\|\vec{i}\right\| \cdot \left\|\vec{j}\right\|}, \tag{6}$$

where "•" represents the dot product of the vector and $\vec{i}, \vec{j}$ represents the user rating vector.

In the user-item matrix, the similarity of user i, k cannot be obtained directly, but can be approximately obtained by the similarity of user i, j and user j, k.

$$w_{i,j} = \frac{1}{n} \sum_{k} \frac{w_{i,k} + w_{k,j}}{2}. \tag{7}$$

CF can reduce the complexity of scoring prediction by some algorithms, but in the face of massive data, these reductions are negligible. This section improves the processing ability of CF algorithm by parallelizing CF algorithm on Hadoop platform. The flowchart is shown in Figure 2.

With massive data, it is impossible to load all data into memory. Predata sorting classifies a bunch of messy data according to user ID and brushes out unused information, which can speed up postdata processing. There is no correlation between the data, and the data can be distributed to different execution nodes to improve the execution efficiency. However, the similarity between users is independent, so the
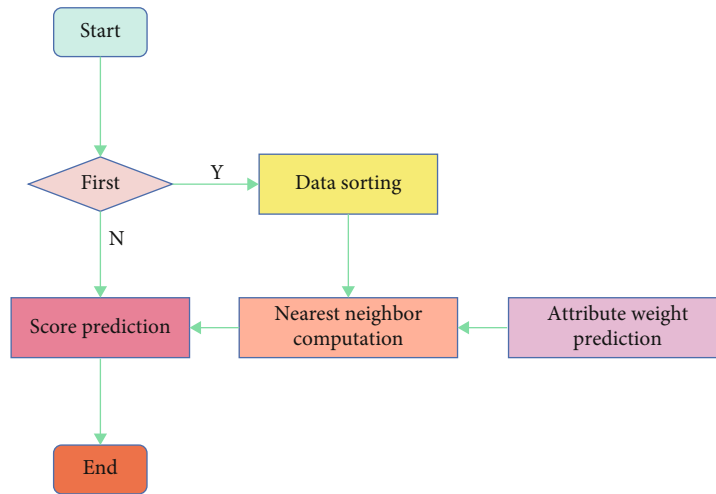
FIGURE 2: CF parallel process.

similarity calculation can be parallel. On Hadoop platform, the similarity calculation is distributed to multiple subnodes, and the heap sorting used generates the nearest neighbor.

MIT can promote the scientific decision-making of SG and the refinement of governance methods through the analysis of massive data, which provides a new method and a new way to improve the refinement level of SG. It represents the emergence of a new type of cooperative living community, and the individuals that make up this community will be critical individuals with independent spirit and self-identification consciousness. They are talking to themselves and constructing each other in the communication field opened up by MIT in our time and will eventually condense and form the consensus that belongs to us.

It is the general trend for modern social services to develop towards diversification of subjects and specialization of division of labor, and it is also the basic feature of SG. The core structure and unit of SG is social organization, whose value is mainly embodied in assisting the government to carry out public service matters, organizing more social subjects to participate in SG together, developing and implementing various professional social work projects, and fundamentally solving the situation that the traditional public service system cannot cover various diversified needs.

4. Result Analysis and Discussion

With the development of practice and the deepening of research, the competitive opposition relationship between the state and social organizations emphasized in the traditional dual theoretical framework is being questioned by more scholars. They found that the benign relationship of cooperation and cogovernance between the state and social organizations can be established, which is not necessarily a competitive relationship. The goal of social transformation from "government governance" to "social cogovernance" can be fully realized, and it has become an inevitable requirement of modern SG innovation.

This section takes public conflict (public conflict) as an example to explore its distribution law in time and space.

Firstly, the morphological characteristics of events in macro distribution are analyzed by statistical means. Then, through cluster analysis and density analysis, the high-incidence areas and low-incidence areas of public conflicts are explored, and their cluster centers are explored to provide decision-making basis for the next stage of social management.

The number of public conflicts in each month is counted by month, and the result is shown in Figure 3.

From the situation analysis in Figure 3, the public conflict does not change periodically with the passage of time. Although there is no periodicity, the time distribution of public conflicts is not uniform, and the differences are large. Among them, from April 2020 to August 2020, there are relatively frequent public conflicts, while at other time periods, there are relatively few public conflicts. Therefore, in terms of time distribution, public conflicts cannot provide effective help for the later management.

Taking every two months as the time interval, count the number of conflicts and fights every two months, and get the result as shown in Figure 4.

In Figure 4, the line charts of the two types of events almost coincide, and it can be considered that the two types of events are strongly correlated in time distribution. Considering that these two events are related in spatial distribution, it can be concluded that there is a strong correlation between conflicts and fights in temporal and spatial distribution.

In the home care service system, a diversified cooperation system has been formed, and the relationship between them is equal and mutual assistance. The government is no longer the superior department, but the funder of social organizations, and the masses are no longer the beneficiaries who are eager for gifts, but the customers who enjoy the services of social organizations, that is, God. Because the government's investment ultimately comes from the national tax revenue, the old people who receive the care service from the Association for the Aged are actually just enjoying their own welfare. After several years of operation, this model has gradually matured, providing useful reference for local governments to purchase social public services.
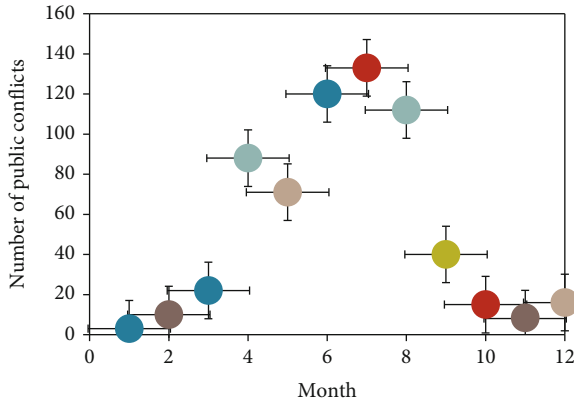
Figure 3: Time series characteristics of public conflicts.

Based on this strong correlation of time and space, it can be obtained: conflicts and disputes are important incentives for fights. And if we do not handle contradictions and disputes properly, it will easily lead to the escalation of the situation and turn into fights. Therefore, in maintaining social order, the investigation and mediation of contradictions and disputes are particularly important.

From the algorithm analysis, the execution time of parallel K-means algorithm and SD-K-means algorithm only depends on the initial center point under the same conditions. In the experiment, the number of Hadoop platform nodes is set to 4, and the data sets S0, S1, S2, S3, and S4 are tested, respectively, and the results are shown in Figure 5.

It can be seen from Figure 5 that the iteration times of SD-K-means algorithm and parallel K-means algorithm generally increase with the increase of data volume, but the iteration times of SD-K-means algorithm are less than those of parallel K-means algorithm. Because SD-K-means algorithm confirms the initial point based on sampling and density, it is more targeted than random point selection, so it can converge faster.

This interaction is also reflected in the relationship between the government and social organizations in SG, which is transformed from the relationship between leaders and leaders to partnership or cooperation. This is also an important change in the exploration of SG. The government is responsible for planning the development of public services, formulating overall policies, exploring scientific financial support forms, and supervising and evaluating service quality, while social organizations have done a lot of work in understanding social needs, improving service quality and social recognition.

Acceleration ratio refers to the ratio of the execution time of a task under single processing to that under multiple processors, which is often used to measure the performance and effect of program parallelization. Experiments were conducted to test the execution time of S0, S1, S2, S3, and S4 data sets on different nodes. Figure 6 shows the speedup ratio of parallel K-means algorithm, and Figure 7 shows the speedup ratio of SD-K-means algorithm.

Diversified social needs have been fully met. Of course, there is no contradiction between the government's manage-

ment of society and SG. The government's public management of social fields does not exclude the self-organization and management of society, but the self-organization and management of civil society is the premise and foundation of the government's social management function.

The starting point and destination of SG innovation are to solve outstanding problems in social management through reform. Usually, although people can reach a basic consensus on the problems existing in SG. However, the solutions and choices given by different subjects are different. On the one hand, they are subject to the social resources owned by different subjects, and on the other hand, they also reflect the political preferences of different subjects. The basic requirements for accelerating the modernization of SG system and governance capacity are to adhere to the problem orientation, form a situation of "cooperation and cogovernance" among different subjects on the basis of building consensus, and actively explore innovative ways of SG.

MAE (Mean Absolute Error) and RSME (Root Square Mean Error) are commonly used to evaluate the quality of recommendation system, and the accuracy of recommendation results is measured by calculating the error between the predicted score and the real score. In this section, under the same conditions, three formulas (cosine similarity formula, Pearson similarity formula, and modified cosine similarity formula) are compared and tested. The experimental data comes from Movie Lens, and according to the principle of February 8th, the training set accounts for 80% and the test set accounts for 20%. The experimental results are shown in Figure 8.

It can be seen from Figure 8 that under the same conditions, cosine similarity shows better prediction accuracy than the other two similarities. The reason for this may be that there are fewer common scoring items when users' scores are sparse, and it is not reliable to evaluate the similarity between users according to the common scoring items. Therefore, in the following experiments, cosine similarity is chosen as the formula for similarity calculation.

Figure 9 shows the prediction accuracy values of the three algorithms under different neighbor node values. It can be seen from Figure 9 that the hybrid recommendation algorithm is more accurate than the original collaborative algorithm. The prediction accuracy increases with the increase of the number of neighbors and reaches a good accuracy value when the number of neighbors is 20. When the number of nodes exceeds 20, the accuracy is not significantly improved.

Experiments show that the prediction based on attribute weights considers the similarity of users, and it has better prediction effect than the default value, and the hybrid method is better than the traditional CF method. Considering the scalability of the system, this chapter also transplanted the traditional CF method to Hadoop platform. From the experimental results, it has a good speedup on the Hadoop platform.

All power of the state belongs to the people. In view of the operation of public power, build a power supervision system centered on the NPC supervision system, form top-
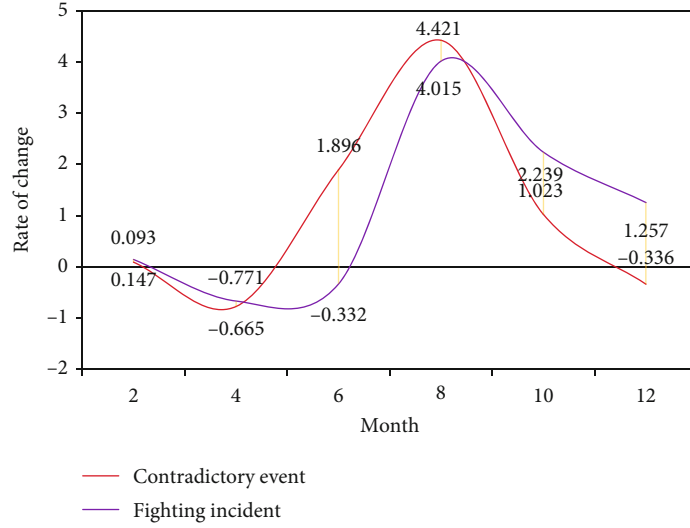
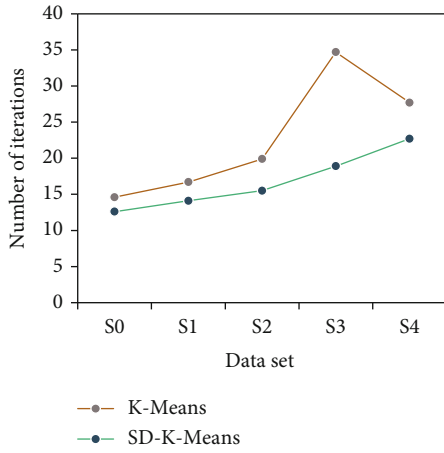FIGURE 4: The number and change rate of disputes-fights.

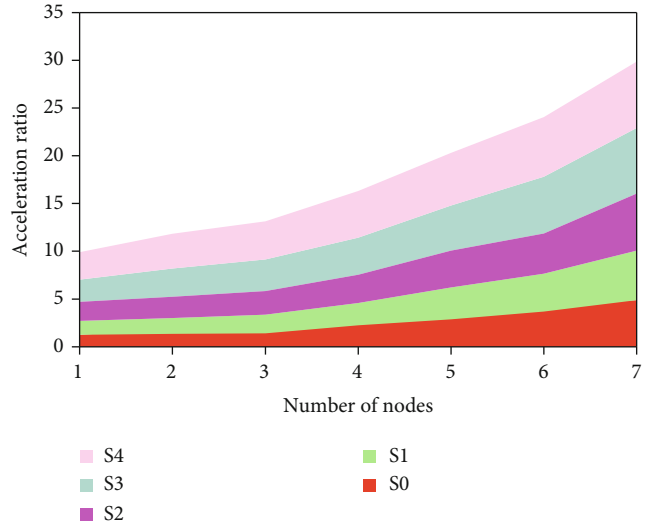FIGURE 5: Algorithm running time chart.

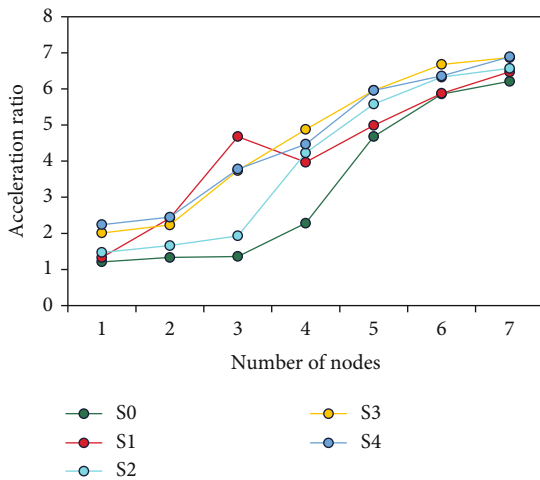FIGURE 6: Acceleration ratio of parallel K-means algorithm.

FIGURE 7: The acceleration ratio of SD-K-means algorithm.

down NPC legal supervision, bottom-up social supervision, and citizen supervision, and integrate the participation of the masses and the popularity of the government to form a benign interactive supervision system. The standardized operation of government is an important guarantee for the development of modern SG by law.

The Internet has entered the homes of ordinary people. In the virtual world of the Internet, all kinds of public opinions are full of people's eyes. If some bad public opinions are not properly guided, they are likely to be used by sensitive groups, causing social unrest. The so-called sensitive groups refer to certain groups or group symbols represented by individuals that are easy to stimulate social emotions, intensify social contradictions, and form network mass incidents in online life. The formation of modern social network system contains benign and interactive social relations, which is an important foundation to realize the coordinated development of modern SG.
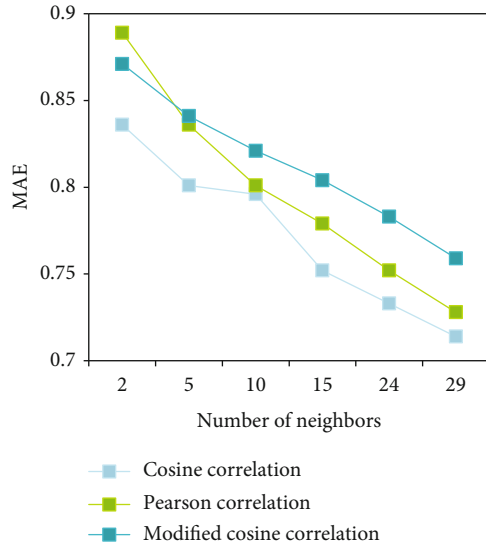
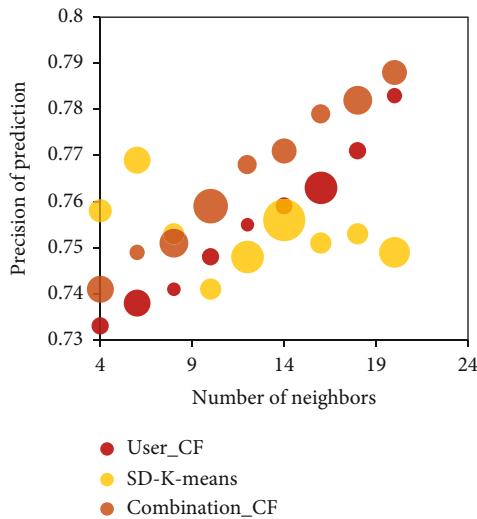FIGURE 8: Experimental comparison results of three similarity formulas.

FIGURE 9: Accuracy charts of three algorithms in different neighboring nodes.

5. Conclusion

To help MIT digitalize SG and promote the modernization of SG system and governance capacity, the key lies in finding out the matching point between MIT and SG innovation. MIT provides a broad space for promoting public organizations that adapt to the development of modern society and provides rich choices for regulating the scientific, standardized, and reasonable operation of modern government. This paper uses ontology technology to process and extract text information. The conceptual system of social comprehensive management events is analyzed. The ontology model of social comprehensive management events is constructed, and the ontology construction process of social comprehensive management events is designed based on this model. A

parallel SD-K-means algorithm based on adoption sum density is proposed. And apply it to Hadoop platform. Through the analysis of experimental results, it can be seen that the improved data mining algorithm has better parallelism than the original algorithm and can handle a larger amount of data. In the case of a large amount of data, the single-machine data mining algorithm is not competent, but the improved Hadoop platform has a good speedup ratio.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

No competing interests exist concerning this study.

Acknowledgments

References

[1] H. Ma, S. Zeng, H. Lin, H. Chen, and J. J. Shi, "The societal governance of megaproject social responsibility," *International Journal of Project Management*, vol. 35, no. 7, pp. 1365–1377, 2017.

[2] S. As-Saber, W. Waheduzzaman, and S. Rahman, "Use of social media in the public E-procurement," *International Journal of Electronic Government Research*, vol. 16, no. 4, pp. 113–132, 2020.

[3] Z. Li, "Analysis on innovative path for social governance at the primary level," *Modern Management Forum*, vol. 4, no. 4, p. 180, 2020.

[4] K. V. Isaeva, "The impact of digitalization of the economy upon social governance: analysis of current global trends," *Nota Bene*, vol. 2, no. 2, pp. 1–7, 2021.

[5] L. F. Dong, Y. Liu, and Department FA, "From social management to social governance: evolution, characteristics and innovation," *Ecology: English version*, vol. 4, p. 5, 2017.

[6] C. Fan, "Analysis of modern aerobics teaching mode innovation based on multimedia information technology," *Boletin Tecnico/Technical Bulletin*, vol. 55, no. 4, pp. 236–242, 2017.

[7] A. O. Nwana and T. Chen, "QUOTE: "querying" users as oracles in tag engines - a semi-supervised learning approach to personalized image tagging," *IEEE Multimedia*, vol. PP (99), pp. 1–1, 2017.

[8] B. Kim, K. E. Psannis, and H. Bhaskar, "Special section on emerging multimedia technology for smart surveillance system with IoT environment," *The Journal of Supercomputing*, vol. 73, no. 3, pp. 923–925, 2017.

[9] D. T. Huynh, M. Chen, T. T. Huynh, and C. H. Hai, "Energy consumption optimization for green device-to-device multimedia communications," *Future Generation Computer Systems*, vol. 92, no. MAR., pp. 1131–1141, 2019.

[10] None, "IEEE Transactions on multimedia information for authors," *IEEE Transactions on Multimedia*, vol. 20, no. 4, pp. 1035-1036, 2018.

[11] X. Ou and W. Hao, "Analysis of physical education teaching model based on multimedia information technology," *Boletin Tecnico/Technical Bulletin*, vol. 55, no. 4, pp. 66–71, 2017.

[12] Y. Fang, "An English-language multimedia teaching model based on Krashen's theory," *International Journal of Emerging Technologies in Learning*, vol. 13, no. 8, p. 198, 2018.

[13] R. Mansoury and M. H. Rezvani, "Barter exchange economy: a new solution concept for resource sharing in wireless multimedia cloud networks," *International Journal of Hybrid Information Technology*, vol. 14, no. 1, pp. 1–26, 2021.

[14] H. Yin, X. Zhang, S. Zhao, Y. Luo, C. Tian, and V. Sekar, "Tradeoffs between cost and performance for CDN provisioning based on coordinate transformation," *IEEE Transactions on Multimedia*, vol. 19, no. 11, pp. 2583–2596, 2017.

[15] H. Ma and W. Liu, "A progressive search paradigm for the Internet of things," *IEEE Multimedia*, vol. 25, no. 1, pp. 76–86, 2018.

[16] X. Li, "Optimization method for English teaching mode innovation and development countermeasures based on multimedia information platform," *Boletin Tecnico/Technical Bulletin*, vol. 55, no. 16, pp. 550–558, 2017.

[17] Y. Zhu, "Research on the application of multimedia computer in news technology," *Revista de la Facultad de Ingenieria*, vol. 32, no. 14, pp. 183–187, 2017.

[18] Y. Djenouri, D. Djamel, and Z. Djenoouri, "Data mining-based decomposition for solving the MAXSAT problem: toward a new approach," *IEEE Intelligent Systems*, vol. 32, no. 4, pp. 48–58, 2017.

[19] E. Seif, J. Rong, and K. G. Oweiss, "Identifying functional connectivity in large-scale neural ensemble recordings: a multiscale data mining approach," *Neural Computation*, vol. 21, no. 2, pp. 450–477, 2019.

[20] L. Xu, C. Jiang, J. Wang, J. Yuan, and Y. Ren, "Information security in big data: privacy and data mining," *IEEE Access*, vol. 2, no. 2, pp. 1149–1176, 2014.

[21] Z. Feng and Y. Zhu, "A survey on trajectory data mining: techniques and applications," *IEEE Access*, vol. 4, pp. 2056–2067, 2016.

[22] N. Carneiro, G. Figueira, and M. Costa, "A data mining based system for credit-card fraud detection in e-tail," *Decision Support Systems*, vol. 95, no. MAR., pp. 91–101, 2017.

[23] I. Triguero, S. González, J. M. Moyano et al., "KEEL 3.0: an open source software for multi-stage analysis in data mining," *International Journal of Computational Intelligence Systems*, vol. 10, no. 1, pp. 1238–1249, 2017.

[24] F. Marozzo, D. Talia, and P. Trunfio, "A workflow management system for scalable data mining on clouds," *IEEE Transactions on Services Computing*, vol. 11, no. 3, pp. 480–492, 2018.

[25] M. E. Mabrouk, S. Gaou, and M. K. Rtili, "Towards an intelligent hybrid recommendation system for E-learning platforms using data mining," *International Journal of Emerging Technologies in Learning*, vol. 12, no. 6, p. 52, 2017.