Retraction

Retracted: Multiple Collaborative Supervision Pattern Recognition Method within Social Organizations Based on Data Clustering Algorithm

Journal of Mathematics

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope

(2) Discrepancies in the description of the research reported

(3) Discrepancies between the availability of data and the research described

(4) Inappropriate citations

(5) Incoherent, meaningless and/or irrelevant content included in the article

(6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] W. Zhang and L. Pang, "Multiple Collaborative Supervision Pattern Recognition Method within Social Organizations Based on Data Clustering Algorithm," *Journal of Mathematics*, vol. 2021, Article ID 7890658, 12 pages, 2021.

Research Article

Multiple Collaborative Supervision Pattern Recognition Method within Social Organizations Based on Data Clustering Algorithm

Wei Zhang [1,2] **and Lili Pang** [3]

[1]*School of Public Administration, Hohai University, Nanjing, Jiangsu 210098, China*
[2]*College of Economic and Management, Nanjing Institute of Technology, Nanjing, Jiangsu 211167, China*
[3]*Development and Planning Division, Nanjing Xiaozhuang University, Nanjing, Jiangsu 211171, China*

Correspondence should be addressed to Wei Zhang; zhangwei@njit.edu.cn

This paper proposes a multiple collaborative supervision pattern recognition method within social organizations based on data clustering algorithm to realize diversified supervision within social organizations and improve the effect of the said pattern recognition. Firstly, the characteristics and functions of social organizations are analyzed, and the definition of social organizations is given. Further, this paper studies the meaning and characteristics of social organization supervision, analyzes the failure of internal supervision of social organizations, and then determines the internal governance elements of social organizations. In addition, the basic steps of pattern recognition are given. Finally, multiple collaborative supervision patterns recognition within social organizations is realized based on data clustering algorithm. Experiments show that this method can improve the recognition accuracy of multiple collaborative supervision patterns and reduce the recognition time.

1. Introduction

Social organizations are the operating subjects of public welfare undertakings, and their credibility determines the rapid development of public welfare undertakings. In recent years, there have been frequent negative public welfare news in China, such as the "Renrenhui" and "Shanxinhui" scam, zhihu goddess fraudulent donation, public welfare worker thunder incident, "Luo Er," and other incidents, which have caused an unprecedented crisis of confidence in China's public welfare undertakings, resulting in a lack of public trust in social organizations. Through in-depth interviews, it is found that there are many problems in the development of social organizations, such as incomplete legal system, lack of transparent information disclosure, and lack of professional talents [1]. Further investigations show that all these problems are caused by the imperfect internal governance structures of social organizations, which affects the healthy development

and benign operation of organizations. The outline of the 13th Five-Year Plan clearly proposes to "improve the management system of social organizations, and form a modern social organization system in which government and social organizations are separated, rights and responsibilities are clearly defined, and autonomy is implemented in accordance with the law." In relevant documents issued by the Ministry of Civil Affairs, it is pointed out that measures such as party building, financial audit, and third-party evaluation should be strengthened, which puts forward higher requirements for internal supervision of social organizations [2]. Zhang et al. [3] proposed the refinement recognition algorithm of power load model based on kernel density clustering, Fan et al. [4] worked on spherical data clustering and used nonparametric Bayesian mixture models for feature selection, and Liu et al. [5] described the pattern recognition of power consumption. For more on pattern recognition and cluster analysis, we refer the reader to [7–12] and [6, 9–13], respectively.

The description and classification of a sequence of events are called the pattern recognition, whose research object is summarized into two categories: the intuitive image and the nonintuitive image. Moreover, the four main parts of the proposed method are as follows: (i) acquisition of information: attaining data by analyzing the topic of interest, (ii) processing: eliminating the noise to achieve the object perfect for computer to deal with it, (iii) feature extraction: processing and analyzing the data to eliminate false, retain true, and extract the features that reflect the essence of things, and (iv) classification decision: using algorithms to identify and classify the information.

Social organization is the third sector outside the government and market, and it is a new form of organization in the process of social and economic development. Whether social organizations can develop in a healthy and orderly manner, the internal governance of social organizations is the key. This paper introduces data clustering algorithm to identify multiple collaborative supervision modes in social organizations and promote diversified supervision strategies in internal governance of social organizations, in order to solve the internal governance dilemma of social organizations and promote the standardized development of social organizations.

This paper is organized as follows: Section 1 presents the introduction and literature review. Section 2 defines the social organization. In Section 3, the meaning and characteristics of social organization supervision are explained. The multiple cooperative supervision patterns recognition method in social organizations based on data clustering algorithm is given in Section 4. Section 5 contains the experimental analysis and Section 6 concludes the paper.

2. The Definition of Social Organization

Globally, every country or region has its own cultural and social environment, so social organizations have different types and forms of appellation in various countries. There is no substantial difference between these appellations, but they are different in expression. China also has different degrees of expression for social organizations, including "civil organizations," "intermediary organizations," and "mass organizations" [3]. The concept of "social organization" began to appear at the sixth Plenary Session of the 16th CPC. After 2006, official documents began to use the more appropriate title "social organizations" instead of "non-governmental organizations." In essence, the "social organization" used in China is no different from the "non-governmental organization" and "non-profit organization" commonly used around the world. It is a concept with more Chinese characteristics. According to Wang Ming, NPS are actually organizations that adhere to the goal of "non-profit," uphold the concept of mutual benefit, adhere to the nature of public welfare, and are independent of the party and government system.

2.1. Characteristics of Social Organization. Social organizations do not belong to the government, nor are they composed of the market, but they have independent "third

parties." Their characteristic is usually distinct, concrete performance is nongovernmental, public welfare, and sociality. One is nongovernmental. Social organizations are actually folk groups formed based on voluntary behaviors [4]. Therefore, they are quite different from national organizations and have extremely outstanding characteristics of nongovernment. Based on the decision-making mechanism, social organizations are full of autonomy, which can reduce constraints and improve efficiency in decision-making. Based on the operating mechanism, social organizations always adhere to the concept of survival of the fittest and have a sense of competition. Once social organizations lose the quality of service, they will inevitably be questioned by the public and face difficulties. On the other hand, government departments have the important feature of administrative monopoly, so they can exist forever without worrying about elimination [5]. In addition, social organization comes from the masses. The organizational structure is relatively simple and flat. As a result, they often have more flexibility as activities progress. Second, public welfare, namely, nonprofit, has always been an important feature of social organizations' independence from the market [6]. First of all, being nonprofit is the fundamental principle of social organization. Social organizations are not prohibited from engaging in business-related activities, but their income is used exclusively for public services. Members of social organizations shall be prohibited from seeking personal gains. Secondly, social organizations tend to have more rigorous and strict self-control systems. Finally, social organizations always uphold the concept of property preservation, and their income is mostly in the form of social donation. Its property rights are not based on national property rights or private property rights but are derived from public resources and have the nature of public property rights [7]. There is no doubt that social organizations have undeniable characteristics of public welfare. Third is sociality. Social organizations work in relatively fixed areas, that is, education, charity, poverty alleviation, and other works, with a significant social nature. Moreover, social organizations also focus on the public. Based on this, it is identified as having social characteristics. The core characteristic of social organizations is being nonprofit, their material resources are mostly from donations, and their staff rely on voluntary participation of volunteers. Moreover, output also has a certain sociality. The purpose of all kinds of services provided by social organizations is to provide better life enjoyment to the public rather than applying them to themselves, so they are public-welfare-oriented [8]. Finally, accountability is also social. One is to establish a complete internal supervision and undertake various forms of supervision from the public. These three characteristics are the characteristics by which social organizations are distinguished. Indeed, with the sustainable development of society, the three characteristics of nongovernment, public welfare, and sociality will be adjusted accordingly [9]. However, it always exists and is an important guarantee that social organizations can be independent from government and enterprises.

2.2. The Role of Social Organization. With their own advantages, social organizations play an irreplaceable role in the appeal of public interests, the adjustment of social contradictions, the provision of public goods and services, the provision of employment opportunities, the enrichment of old-age services, the protection of vulnerable groups, the promotion of public spirit, and other aspects.

2.2.1. Make Up for Government Failure and Market Failure. If the efficiency of government departments is difficult to improve, resource utilization rate is too low and is bound to lead to resource waste. Moreover, the market system suffers from monopoly, which also leads to excessive rigidity in the distribution of goods and services, resulting in social development that is difficult to meet expectations. The advantage of social organization lies in its characteristics of being nongovernment and nonprofit. Therefore, it has an ideal performance in dealing with government failure and market failure [10].

First, social organizations can share government functions to a certain extent. Looking around the world, although the form of single government governance can maintain the authority of the government, its cost support is high and the operation efficiency is not optimistic. In addition, the government often lacks internal supervision, which leads to failure, which is contrary to the concept of interest diversification. If the performance is not up to expectations, public opinion will become worse and the government's recognition will be greatly reduced. Social organizations have unique advantages in the category of fair products. The government and social organizations give full play to their advantages and try to cooperate, helping to provide the public with more diversified forms of services.

Second, the existence of social organizations also provides important carriers for communication and interaction between the government and the public. Under the previous model, there was no buffer between the government and the public. If there is a dispute between the two, due to the lack of interest integration mechanism, serious opposition and other events often occur. If the public believes that the government's policies are too extreme, they lack the necessary communication system and mechanism and even take extreme measures to resist, threatening the stability of the social structure [11]. As nongovernmental organizations, social organizations can become a platform for the government to communicate with the public, effectively deliver government policies to the public, and organize and negotiate the interests of different groups. Moreover, social organizations can also conform to norms and express corresponding interests. Therefore, social organizations promote the effective communication between the government and the public, alleviate social contradictions, and create a stable social environment for social construction.

Third, social organizations also help to allocate social resources. Social organizations have the important feature of being nonprofit. As a result, they are very different from the market companies focused on competition. The corresponding social resources of social organizations can be divided into two categories: one is the resource reserves obtained by charitable donations from different channels and the other is volunteer groups that are dedicated and do not ask for anything. The rational and scientific allocation of social resources ensures that social organizations can express their service objectives and gain public recognition. This will also enable them to supplement more substantial charitable resources and expand their volunteer ranks. It has positive benefits in the field of public welfare activities and can effectively control the negative crisis caused by market failure [12].

2.2.2. Promote Social Harmony and Stability. One of the significances of social organizations is to provide corresponding public services to the society. For example, we will support the poor, improve medical conditions, and promote employment. Social organizations play an irreplaceable role in the development of people's living standards and are also a key link to buffer social contradictions and promote social harmony.

First, social organizations can play a role in alleviating social problems. Social organizations can provide corresponding support for public interest expression. In addition, they can also actively allocate social resources to ensure that the social vulnerable groups get spiritual care, as well as the necessary material support, to solve the urgent need, to ensure that their living needs are guaranteed.

Second, social organizations ensure the diversity of public life [13]. As China's reform and opening-up policy continues to unfold, cultures from all over the world are becoming more and more integrated. Based on this, the public's cultural needs are also colorful. The emergence of social organizations makes it possible for the public to find their favorite social organizations to participate in various social activities based on their own needs. This can also bring about a flowering of social life.

Third, social organizations can promote the harmonious development of man and nature. The report of the 18th National Congress of the Communist Party of China once explained the scientific discussion of "five-in-one," and the construction of ecological civilization is increasingly valued and respected [14]. For example, environmental protection social organizations are committed to assisting the government in formulating policies related to environmental protection and providing professional advice. Education and promotion of environmental protection knowledge and concept play a vital role in promoting the harmonious development of man and nature.

3. The Meaning and Characteristics of Social Organization Supervision

Supervision of social organizations is a process in which the subject of supervision supervises and manages the work of social organizations. This paper defines the supervision of social organizations as follows: the supervision subject of social organizations carries out follow-up supervision and corresponding management of the rules and regulations of

legally registered social organizations, members' daily organizational behavior, and financial situation. Their characteristics are as follows.

First are institutionalization and rule of law. In short, it is the system composition in the supervision of social organizations, namely, the system composition that social organizations should strictly abide by when implementing supervision and management [15]. Based on the cases of developed countries, we can clearly realize that the institutionalization of supervision can provide essential legal guarantee for the supervision of social organizations. Australia's Public Service Act and Japan's Government Policy Evaluation Act are all based on legislation to ensure that the government can meet the requirements of norms and conduct orderly supervision on social organizations. In the category of social organization legislation in China, there is a certain degree of lag. In fact, until the current stage, China has not set up systematic and mature supervision laws for social organizations. Relevant requirements and opinions are scattered in other laws and regulations [16].

Second are openness and transparency. Information disclosure of social organizations is conducive to public supervision, and it is also a prerequisite for social organizations to perform their public welfare duties and can provide reliable support for the protection of public rights and interests. In recent years, government information disclosure has also been actively explored in various parts of China, which is conducive to organization members and the public to understand information related to activities of social organizations, improve social credibility, influence, and cohesion, and implement industry self-discipline [17].

Third is mechanism diversification. The regulation of social organizations is analyzed: whether it comes from the government regulation of external regions, or is a form of self-supervision that develops within the organization. They all have the characteristics of rich levels, diversified subjects, and extensive channels. On the one hand, there is the government supervision, and, on the other hand, there is the public opinion supervision from the public or the news media. Internal supervision and management are also abundant, and the corresponding supervision from the system and members is of great value [18]. It also includes the oversight provided by the organization's stakeholders. Fourth is target responsibility. Fayol once regarded power and responsibility as the components of management principles, indicating that power and responsibility are interdependent and complementary to each other. Responsibility goes hand in hand with power, and if it has power, it also has to bear the corresponding responsibility. Social organizations are public welfare, so their public social responsibility is highly valued. Unfortunately, the accountability system set up based on the supervision and management of social organizations still needs continuous improvement and supplement: for the first time, the ethnic composition of the responsible subject is known, followed by the detailed responsibility inspection steps and finally strengthening accountability.

3.1. The Content of Social Organization Regulation

3.1.1. Supervision over Registration of Social Organizations. In addition to the supervision of social organizations, our country adheres to the form of "preventive system." In short, the state has raised the threshold requirements for the registration of social organizations and strictly upheld the requirement of permission registration. If NGOs fail to meet the needs and obtain permissions, they will naturally find it difficult to register and will become illegal. The advantage lies in that the state can effectively grasp the legitimacy and compliance of social organizations and complete strict restrictions on illegal organizations [19]. According to the relevant regulations on the registration of social organizations and foundations, the registration of social organizations should strictly abide by three conditions. Social activities should first conform to the purpose and have the characteristics of public welfare, second have independence and autonomy, and third have the asset composition that meets the demand, as well as the fund supplement that conforms to the law. Moreover, the appellation of social groups should not be arbitrary but conform to the legal norms and avoid violating moral customs. When naming a social group, it should strictly follow the business category, membership configuration, operation interval, and other factors, and it should clearly grasp the characteristics of the organization.

3.1.2. Daily Supervision of Social Organizations. The government's daily management of social organizations focuses on two levels. The first is the construction of laws and regulations. In fact, the daily management of social organizations is complicated, and many behaviors are too chaotic to be controlled. Therefore, in addition to daily management, administrative regulations are often attached importance. The second is the annual inspection system. The regulation on the registration and management of social organizations says strict annual inspections must be carried out around social organizations, with the authorities responsible for corresponding preliminary audit tasks. In addition, major activity reporting mechanism and corresponding examination and approval system are among the key components of daily management.

3.1.3. Financial Supervision of Social Organizations. The Chinese government's financial supervision of social organizations is reflected in three aspects: The first aspect is the requirements for being nonprofit. The Regulations on the Registration and Administration of Social Organizations (2016) clearly instruct social organizations to prohibit profit-based activities. The second aspect is in view of the proportion of expenditure of donated property requirements. The Public Welfare Donation Law of the People's Republic of China clearly states that the fund expenditure in public welfare should meet the specific proportion required by the state. The third aspect is practice financial disclosure system. The Regulations on the Registration and Administration of Societies provide instructions for financial disclosure, and

relevant behaviors such as accepting or applying donations need to be made public in accordance with the regulations.

3.2. Classification of Supervision of Social Organizations.
In terms of type division, social organizations focus on their own characteristics. Social organizations have outstanding characteristics of independence and have the important characteristics of nongovernment. This determines that a public service is not a government welfare, nor is it a corresponding private product derived from a for-profit organization. Social organizations are engaged in precisely the public work that the government and profit-making institutions, for some reason, resist, find difficulty to accomplish, or are rarely able to accomplish. In order to grasp the basis and significance of the classification of supervision types of social organizations, the first task is to understand the classification of social organizations. Before the third Plenary Session of the 18th CPC Central Committee, based on traditional thinking, China pointed out that social organizations are actually composed of four categories: industrial and commercial economy, social welfare, charity, and social service. Based on the trend of The Times, the third Plenary Session of the 18th CPC Central Committee was redistributed into six categories, namely, industry associations and chambers of commerce, public welfare charities, science and technology, urban and rural community services, interest and volunteer service organizations, and religious organizations. In the classification of social organization supervision, the corresponding classification methods of social organization should not be strictly adhered to.

3.3. Determine the Internal Governance Elements of Social Organizations

3.3.1. Multiple Supervision Subjects within the Organization.
The subject of supervision is the one or several parties that shoulder the responsibility of internal supervision of social organizations. According to the logic model of axial coding and responsive regulatory perspective of pluralistic social organization coordinated regulatory path, in the social organization management regulation, use of the government, the self-regulation, the public, and the four elements of the third-party institutions coordinated regulation, to contribute to the improvement of the social organization management, make its management specification, to enable sustainable development to the organization.

(i) Government: centralized supervision of organization operation. The government is responsible for centralized administrative management of social organizations, so it plays the main supervision role of internal governance. Its supervision of social organizations is manifested in the formulation and implementation of rules for the registration and management of social organizations, the implementation of supervision of social organizations

according to law, and the supervision and guidance of local social organization registration and management. In the narrow sense, the supervision responsibility is the daily supervision of the operation of social organizations, such as the conduct and result supervision of the managers, council, secretariat, and ordinary members of social organizations under the constraints of laws and regulations. It is also the main content of daily supervision for social organizations to receive classified guidance and periodic inspection from centralized management departments; and this is taken as an important measure to normalize the supervision of the daily operation process of social organizations.

(ii) Self-regulation: the regulation of improving internal governance. In order to improve the internal management level of social organizations, social organizations can also carry out self-regulation and improve the ability of self-discipline and autonomy. Therefore, self-regulation is also the main supervision subject of the internal governance of social organizations. Through a large number of media surveys on charitable activities with public welfare corruption and severe damage to the credibility of social organizations, it can be found that there is an urgent need to establish and improve the self-discipline and supervision mechanism of social organizations to improve their management level and improve operational efficiency. At the present stage, the internal governance of social organizations in China has some problems, such as insufficient supervision consciousness, lack or imperfect supervision system, insufficient supervision executive force, and weak self-discipline mechanism. It is easy to make self-supervision become a mere form of self-justification, resulting in the failure of supervision. The mutual supervision mechanism from outside social organizations has not yet been formed. The establishment of the internal management and supervision mechanism of social organizations should be based on laws and regulations and on the premise of abiding by the rules of the industry, and the responsibilities and powers of decision-making organs, executive organs, and supervision organs should be clearly defined, and various activities of the organizations should be carried out within the regulatory framework.

(iii) Public: strengthen the consciousness of subject supervision responsibility. The conditions for the public to be the subject of supervision come from three aspects. The first is the donation or service purchase behavior of the public directly to social organizations. As a principle of reciprocity in real right transaction, social organizations naturally have the obligation to accept the supervision of the public, which has the attribute of market. The second is that social organizations provide services

to the public as an important undertaking subject. For example, the government purchases public services from social organizations, but, as the served party, the public can make joint and several claims to social organizations, thus forming an obligation of indirect supervision. The third is that, in view of the public welfare nature of social organizations, every public that cares about the organization or has doubts about the vision and behavior of the organization can, as taxpayers, enjoy the natural right to supervise the social organizations approved by the government and registered with qualifications. Therefore, the public supervision with extensive participation consciousness can urge social organizations to strengthen self-discipline.

(iv) Third-party evaluation agencies: strengthening supervision during and after the event. The government transfers part of its regulatory authority through certain authorization or service outsourcing so that more other institutions become regulatory subjects. The supervision authority of third-party evaluation institutions on social organizations mainly comes from the transfer of government power. Internal governance of the third-party supervision that refers to the social organization has the qualification of the interest related third parties under the principle of laws and regulations, scientific design review procedures, and inspection standards, to organize society including but not limited to financial audit, operation management, achievement and performance appraisal, and specified aspects of assessment and grading and issue the evaluation report. As a useful supplement and correction of government supervision, third-party supervision with professional and independent characteristics and basic requirements plays an important role in the modernization of China's internal governance system and governance capacity of social organizations. Its importance is reflected in the following aspects: First, it promotes the transformation of government functions and desalinizes the compulsory administrative color in the evaluation process. Second, it promotes the social transformation of the service-oriented government. This is not only because third-party supervision can divert the burden of the government but also because third-party supervision and evaluation can play a greater role in strengthening the in-process and post-process supervision. Third, third-party evaluation focuses on the significance of social forces in the coordinated supervision of social organizations and enhances the credibility of social evaluation.

3.3.2. Multiple Regulatory Contents within the Organization. In the process of using the supervision of social organizations, in the link of internal governance, the four important contents of the supervision of the mission and voluntary spirit of the organization, the sound evaluation mechanism and supervision mechanism, the quality of the leaders, and the structure of the organization are realized, so as to expand and improve the internal governance of social organizations.

(i) Organizational mission and volunteerism. The board structure can make the organization's mission more clear, can make the organization's decision-making strategy more reasonable and feasible, can make the supervision more comprehensive, and can achieve self-assessment. The mission is the direction of an organization, which needs to be defined at the beginning of its establishment and gradually adjusted with the development. The primary responsibility of the Board of Directors is to define the mission of the organization, ensure that the members of the organization are loyal to the mission, and put forward specific provisions and constraints on the goals, activity areas, and development modes of the organization. The establishment of the organization's mission to correspond to the situation of national development, in terms of development at the present stage in China, the need to address the education, grassroots governance, and related problems such as poverty and environmental governance, because of these problems is crucial in the field of society; the government needs to pay attention to these important issues, to solve these problems to improve the public satisfaction. The government can provide policy and financial support to social organizations, and it is also required that the government further strengthen the mission, voluntary spirit, and supervision of social organizations.

(ii) Sound evaluation mechanism and supervision mechanism. The rapid development of the social organization brought a great challenge for the regulatory system, improves and perfects the system of social organization regulation, and must introduce the social institutions of the third-party evaluation and objective evaluation on the performance on the development of social organizations, to strengthen social organization registration, financial content, project activities, organization development, and matter, and afterwards supervision has become the important content of social organization internal governance. 19th National Party Congress pointed out the direction of the future development path of social organization and also put forward more specific requirements, social organization regulation according to ZhengShe separation reform train of thought, not only at the time of registration review stage, and to improve the existing evaluation system as soon as possible, set up in advance, matter and afterwards whole process supervision system, to perfect innovative ways and means and ensure the orderly progress of supervision over social organizations.

(iii) Leadership qualities. Council members, administrative staff above the middle level, and those responsible for major projects are considered to be the leadership of the social organization. The quality of leaders is the key to the existence and development of social organizations and the fate of organizations. This is especially true for social organizations. Due to their special organizational structure and governance mode, the quality of leaders is very important for the realization of social organizations' goals, activities, development trajectory, and organizational performance. Leaders of social organizations should not only have strong professional qualities like corporate executives but also take into account the particularity of social organizations and possess high political quality and moral accomplishment, so as to guide members to practice the mission and core socialist values of social organizations.

(iv) Personnel structure. Human resources are the foundation and guarantee for the development of social organizations, while personnel structure is the key factor restricting the effect of internal governance of organizations. Through the investigation, it is found that part-time workers account for a relatively high proportion of social organizations, and the uneven quality of staff is also a common problem. Therefore, we must strictly implement the basic requirements of the personnel structure in social organizations: First, the proportion of full-time staff in social organizations is higher than that of part-time staff. Second, in the total number of staff in social organizations, those with bachelor's degrees or above account for more than half. Full-time staff refers to those who have established formal social labor relations with social organizations and those who are specialized in the work of social organizations, excluding administrative staff, labor dispatch personnel, and part-time staff and those who are rehired after retirement. Therefore, to strengthen the construction of personnel in social organizations, we should not only ensure the number of staff, especially the number of full-time staff, but also pay attention to the quality of staff and optimize the personnel structure of social organizations.

3.3.3. Analysis of the Failure of Internal Supervision in Social Organizations

(i) Policies and regulations lag behind. A sound legal system is the institutional guarantee for the good operation of society, and the legal operation and supervision of social organizations are the fundamental prerequisite for the governance of social organizations. The improvement of relevant policies and regulations can guide and standardize the governance of social organizations, facilitate the connection between the two regulatory parties, and provide a framework for the dialogue and consultation on regulatory matters. At the present stage, the legal system of internal governance and supervision of social organizations in China is not perfect. In the survey, many social organizations mentioned that local administrative departments are ineffective in publicizing and promoting laws and regulations or fail to formulate corresponding implementation rules in time, resulting in social organizations having no basis for improving internal supervision. It also affected the enthusiasm of social organizations to implement standardized supervision and improve. On the contrary, the imperfection of policies and regulations has become the main problem restricting the internal governance and supervision of social organizations.

(ii) The management mechanism fails. The internal system design of social organizations should fully ensure the achievement of social organizations' goals and visions and the efficiency of daily operation and provide a performance-related supervision and accountability mechanism for implementation. At present, in the investigation, it is found that the human resource management system, volunteer system, and financial management system of many social organizations are not perfect. Due to the inefficiency or ineffectiveness of the internal management system of social organizations, the operation and development of social organizations cannot be orderly and then the supervision efficiency of the internal governance of social organizations is affected.

(iii) The internal governance structure is not sound. The internal governance structure and management mechanism of social organizations complement each other. It is the carrier of social organization system and the institutional entity for social organizations to realize various operational practices. The redundancy and lack of internal governance institutions will have a negative impact on supervision. However, they appear on different occasions. In the current supervision system of social organizations, institutional redundancy often exists in various administrative supervision subjects, while the content of social organizations is often manifested as the lack of institutions due to the imperfect construction, so that they cannot exercise and complete the docking of supervision functions. Only when social organizations achieve organic structural cohesion can they release organizational efficiency to the greatest extent.

(iv) The application of network technology lags behind. For a long time, because of the uniqueness of administrative mechanism, government agencies have tended to lag behind those outside the system in terms of operation efficiency and new technology application. In addition, it is also necessary for the

public to use Internet technology to participate in the internal governance and supervision of social organizations. With the rapid development of modern information technology and Internet of Things technology and the increase of social organization activities, it is necessary to use network technology to complete the supervision information exchange, supervision policy formulation, and supervision form research and judgment. It has become a general trend to transform traditional application fields including internal governance and supervision of social organizations with the concept of "Internet plus" and big data analysis technology.

4. Multiple Cooperative Supervision Patterns Recognition Method in Social Organizations Based on Data Clustering Algorithm

Pattern recognition refers to the classification and description of a series of processes or events. The processes or events to be classified can be a series of physical objects or some relatively abstract psychological states. Processes or events that have some similar properties fall into one category. The research object of pattern recognition can be basically summarized into two categories: One is intuitive image, such as image, graph, text, remote sensing image, cell, or other biological slices, etc. The other type of image is nonintuitive, such as language, ECG pulse waveform, object detection waveform, and seismic wave. The general components of a pattern recognition system are shown in Figure 1. There are four main components.

The first part is the acquisition of information, which is equivalent to the investigation and understanding of the object of study, from which data and materials are obtained. The second part is preprocessing; its purpose is to remove interference, noise, and difference and turn the original object into a form suitable for computer feature extraction. The third part is feature extraction. Its function is to process, sort out, analyze, and summarize the data materials learned from the investigation to eliminate the false and retain the true, remove the dross, and extract the essence, as well as extracting the features that can reflect the essence of things. Of course, what features are extracted and retained has a lot to do with what kind of judgment is adopted. The fourth part is the classification decision, that is, according to the extracted characteristic parameters, using a classification discrimination algorithm (such as fuzzy clustering analysis method) and discrimination rules, to classify and identify the information and get the recognition results, of course, in the classification decision, must consider the validity of the classification.

4.1. The Basic Steps of Pattern Recognition. In practical applications, the design of a single pattern recognition system is a complex task and is often a recycling process. It is impossible to try to provide a comprehensive algorithmic process but considering the intrinsic relevance of pattern recognition, probably to describe the basic steps of pattern

recognition system is feasible; therefore, the basic implementation steps of a pattern recognition system can be described as follows:

Step 1: Consider possible description; we study pattern recognition, including quantification of pattern structure and estimation of probabilistic description, possible intra- and interclass similarity measurement, distortion of pattern, invariance of noise source, and description.

Step 2: Identify utilized characteristics and measurement data.

Step 3: Consider the expected system operating indicators and computing resource constraints, such as running speed and classification accuracy.

Step 4: Consider available training data.

Step 5: Consider the appropriate pattern recognition techniques available (e.g., fuzzy clustering analysis, etc.) and consider the overall pattern recognition system structure.

Step 6: Establish a pattern recognition system simulation implementation, including the selection of model, semantic or network structure.

Step 7: Train the system built.

Step 8: Simulate the execution of the system.

Step 9: Repeat the above steps until the desired results of the system are achieved.

The realization steps of fuzzy set recognition algorithm are as follows.

The algorithm for pattern recognition of fuzzy sets can be described as follows: Suppose that there are n fuzzy sets $A_1, A_2, \ldots, A_n$, where $A_i = (i = 1, 2, \ldots, n)$ represents n types.

When a recognition algorithm acts on object x, membership degree $\mu_{Ai}(x)(i = 1, 2, \ldots, n)$ is generated, indicating the degree to which object x belongs to set A_i. If a clear description of a recognition algorithm has been given, this algorithm is called explicit. If the algorithm is not clearly described, this algorithm is called ambiguous. People directly recognize object x through ambiguous algorithm, and pattern recognition is to convert an ambiguous algorithm into explicit algorithm, from identifying the object itself to identifying its pattern.

In principle, the implementation of fuzzy set recognition algorithm is divided into three steps:

Step 1: Feature extraction: extract various features related to recognition from object x, measure the specific data of x on each feature, and convert x into pattern $p(x) = \{x_1, x_2 \ldots, x_n\}$. This step is the basis. Whether the feature extraction is appropriate will directly affect the recognition results. However, this work involves the background of specific problems and the knowledge and skills of recognizers, so it is difficult to make a general discussion.

Step 2: Establish the membership function and establish a clear algorithm to generate the membership function
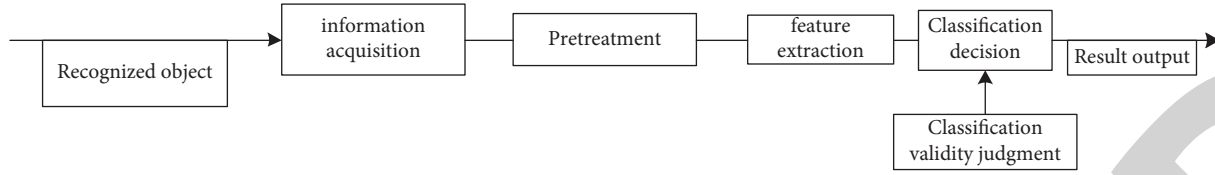
FIGURE 1: Structural block diagram of pattern recognition system.

$\mu_{Ai}(x)$, $i = 1, 2, \ldots, n$, x is the membership degree; $\mu_{Ai}(x)$ belonging to A_i depends on $x_1, x_2 \ldots, x_n$. There is no general or universal principle to determine the membership function, and many methods in application also have subjective and empirical components.

Step 3: Identification decision: judge the identified object x according to a certain attribution principle and point out which type it should belong to and the effectiveness of classification. Some of the common recognition and decision methods are maximum membership principle recognition method, proximity principle recognition method, and fuzzy cluster analysis recognition method. When choosing different fuzzy set theory knowledge and using different recognition algorithms, different implementation steps will be obtained.

4.2. Multiple Collaborative Supervision Patterns Recognition within Social Organizations Based on Data Clustering Algorithm.
Data clustering algorithm is a classical hard clustering algorithm. It is based on within-group sum of squared errors and minimum criterion, which can classify data sets with hyperellipsoid distribution.

The sample set to be classified is $X = \{X_1, x_2 \ldots, X_n\}^T \subset R^{n \times p}$, n is the number of elements in the data set, c $(2 \le c \le n)$ is the classification number of samples, and the data clustering algorithm can be expressed as the mathematical problem of the minimum objective function J_1; that is,

$$\min J_1(X, \mu, v) = \sum_{i=1}^{c} \sum_{j=1}^{n} \mu_{ij} \|v_i - X_j\|^2 = \sum_{i=1}^{c} \sum_{j=1}^{n} \mu_{ij} d_{ij}^2. \quad (1)$$

$J_1(X, \mu, v)$ is the classical objective function of sum of squares of within-class errors, d_{ij} is Euclidean distance, which represents the similarity measure between sample X_j and cluster center v_i. The calculation formula of d_{ij} is as follows:

$$d_{ij} = \|v_i - X_j\| = \sqrt{\sum_{l=1}^{p} (v_{ij} - x_{jl})^2}, \quad 1 \le i \le c, 1 \le j \le n. \quad (2)$$

The clustering criterion is to obtain the appropriate partition matrix $\mu = \{\mu_{ij}\}$ and a group of clustering centers v_i so that the objective function J_1 reaches the minimum. According to the Lagrange multiplier method, μ_{ij} and v_i are

$$\mu_{ij} = \begin{cases} 1, & d_{ij} = \min_{k}\{d_{kj}\}, \\ 0, & d_{ij} \ne \min_{k}\{d_{kj}\}, \end{cases} \quad 1 \le i \le c, 1 \le j \le n. \quad (3)$$

$$v_i = \frac{\sum_{j=1}^{n} \mu_{ij} X_j}{\sum_{j=1}^{n} \mu_{ij}}, \quad 1 \le i \le c. \quad (4)$$

The calculation flow of data clustering algorithm is as follows:

Step 1: Set the number of cluster categories c, initialize the partition matrix T_c, $\mu_{(0)} = \{\mu_{1i(0)}, \mu_{2i(0)}, \ldots, \mu_{ci(0)}\}^T$, $1 \le i \le n$ according to the three constraints (4)–(6), and set an arbitrarily small iterative cut-off error value $\varepsilon > 0$, and the maximum number of iterations of the algorithm $T_{\max}$ $t = 0, 1, 2, \ldots, T_{\max}$.

Step 2: From $\mu(t) = \{\mu_{1i(t)}, \mu_{2i(t)}, \ldots, \mu_{ci(t)}\}^T$, calculate the cluster center according to equation (4).

$$v_i(t) = \frac{\sum_{j=1}^{n} \mu_{ij(t)} X_j}{\sum_{j=1}^{n} \mu_{ij(t)}}, \quad 1 \le i \le c. \quad (5)$$

Step 3: Calculate the submatrix of data clustering algorithm according to the following equation:

$$\mu_{ij\ (t)} = \begin{cases} 1, & d_{ij(t)} = \min_{k}\{d_{kj(t)}\}, \\ 0, & d_{ij(t)} \ne \min_{k}\{d_{kj(t)}\}, \end{cases} \quad 1 \le i \le c, 1 \le j \le n. \quad (6)$$

Step 4: If $\|\mu_{(t+1)} - \mu_{(t)}\| \le \varepsilon$, when the system reaches a stable state, the iteration is terminated to obtain the required clustering center v_i and data clustering algorithm partition matrix $\mu = \{\mu_{ij}\}$. Otherwise, make $t = t + 1$ and turn $\mu_{(t)} = \mu_{(t+1)}$ to Step 2 to continue.

The above algorithm can also use the initialization cluster center v as the initial state, and its basic idea and implementation steps are basically similar to the above method.

Dunn extends the data clustering algorithm to the fuzzy situation according to the fuzzy division concept of set defined by Ruspini and weights the membership degree; that is, μ_{ij} in the data clustering algorithm becomes μ_{ij}^2. Therefore, Dunn gives the following recognition process of multiple collaborative supervision patterns within social organizations of the data clustering algorithm:

$$\min J_2(X, \mu, v) = \sum_{i=1}^{c} \sum_{j=1}^{n} \mu_{ij}^2 \left\| v_i - X_j \right\|^2 = \sum_{i=1}^{c} \sum_{j=1}^{n} \mu_{ij}^2 d_{ij}^2. \quad (7)$$

The above expression is extended to a more general case, and a general description of data clustering algorithm is given:

$$\min J_m(X, \mu, v) = \sum_{i=1}^{c} \sum_{j=1}^{n} \mu_{ij}^m \left\| v_i - X_j \right\|^2 = \sum_{i=1}^{c} \sum_{j=1}^{n} \mu_{ij}^m d_{ij}^2, \quad (8)$$

where μ_{ij} satisfies three constraints, that is, (7)–(9), $m \in [1, \infty)$ is a weighting coefficient, and $J_m(X, \mu, v)$ is the objective function of the weighted sum of squares of the in-class error.

The clustering criterion is to obtain the appropriate fuzzy partition matrix $\mu = \{\mu_{ij}\}$ and fuzzy clustering center v_i, so that the objective function $J_m(X, \mu, v)$ reaches the minimum. According to the Lagrange multiplier method, the fuzzy partition matrix μ_{ij} and fuzzy clustering center v_i are

$$v_i = \frac{\sum_{j=1}^{n} \mu_{ij(t)}^m X_j}{\sum_{j=1}^{n} \mu_{ij(t)}^m}, \quad 1 \le i \le c, \quad (9)$$

$$\mu_{ij} = \frac{1}{\sum^c \left(d_{ij}/d_{kj} \right)^{2/m-1}}, \quad 1 \le i \le c, 1 \le j \le n. \quad (10)$$

The implementation steps of data clustering algorithm are as follows:

Step 1: Set the number of clustering categories c, initialize the fuzzy partition matrix and partition matrix $\mu_{(0)} = \left\{ \mu_{1i(0)}, \mu_{2i(0)}, \dots, \mu_{ci(0)} \right\}^T$, $1 \le i \le n$ according to three constraints in (5) and (6), and set an arbitrarily small iterative cut-off error value $\varepsilon > 0$, as well as the maximum number of iterations of the algorithm $T_{\max}$, $t = 0, 1, 2, \dots, T_{\max}$.

Step 2: From $\mu(t) = \left\{ \mu_{1i(t)}, \mu_{2i(t)}, \dots, \mu_{ci(t)} \right\}^T$, the fuzzy clustering center $v_{(t)}$, $1 \le i \le c$ is calculated according to equation (9).

Step 3: The fuzzy partition matrix $\mu_{ij(t)}$, $1 \le i \le c, 1 \le j \le n$ is calculated according to equation (10).

Step 4: If $\left\| \mu_{(t+1)} - \mu_{(t)} \right\| \le \varepsilon$ and the system reaches a stable state, terminate the iteration to obtain the required fuzzy clustering center v_i and fuzzy sub matrix $\mu = \{\mu_{ij}\}$; otherwise, make $t = t + 1$ and turn $\mu_{(t)} = \mu_{(t+1)}$ to Step 2 to continue.

Note that, for data clustering algorithm, the clustering problem is transformed into a nonlinear optimization problem with constraints, which is generally difficult to obtain its global minimum. In order to obtain better clustering results, the usual method is to use the iterative algorithm of alternately optimizing the fuzzy partition matrix μ and the clustering center matrix v_i to obtain a local minimum. The implementation method of the above data clustering algorithm is actually an offline learning method without supervision information. The data set x to be classified is all input at one time for clustering analysis.

5. Experiment

5.1. Analysis of Pattern Recognition Accuracy. In order to verify the effectiveness of multiple collaborative supervision patterns recognition method within social organizations based on data clustering algorithm, the accuracy of multiple collaborative supervision patterns recognition needs to be verified. The recognition accuracies of multiscale clustering analysis method, multidimensional feature fusion method, kernel density clustering method, and data clustering algorithm are compared. The results are shown in Table 1.

According to Table 1, the effectiveness of multiple collaborative supervision patterns recognition methods within social organizations is different under different methods. When the number of experimental iterations is 50, the accuracy of multiscale cluster analysis method is 67.65%, that of multidimensional feature fusion method is 65.67%, that of kernel density clustering method is 54.55%, and that of data clustering algorithm is 97.45%. When the number of experimental iterations is 150, the accuracy of multiscale cluster analysis method is 71.65, that of multidimensional feature fusion method is 70.30%, that of kernel density clustering method is 59.32%, and that of data clustering algorithm is 93.32%. The recognition accuracy of multiple collaborative supervision patterns within social organizations of this method is significantly higher than those of the other methods, which shows that the recognition effectiveness of this method is better.

5.2. Pattern Recognition Efficiency. In order to verify the efficiency of this method in multiple collaborative supervision patterns recognition within social organizations, the recognition times of multiscale clustering analysis method, multidimensional feature fusion method, kernel density clustering method, and data clustering algorithm are compared. The results are shown in Table 2.

According to the analysis of Table 2, when the number of iterations is 100, the time for multidimensional collaborative supervision pattern recognition of multiscale clustering analysis method is 57.75 s, the time for multidimensional collaborative supervision pattern recognition of multidimensional feature fusion method is 60.60 s, the time for multidimensional collaborative supervision pattern recognition of kernel density clustering method is 54.56 s, and the time for multidimensional collaborative supervision pattern recognition of data clustering algorithm is 17.73 s. When the number of iterations is 300, the multiscale cluster analysis method takes 186.78 s for multidimensional collaborative supervision pattern recognition, the multidimensional feature fusion method takes 143.43 s for multidimensional collaborative supervision pattern recognition, the kernel density clustering method takes 132.43 s for multidimensional collaborative supervision pattern recognition, and the data clustering algorithm takes 36.43 s for multidimensional collaborative supervision pattern recognition. According to the above results, the time of recognition of multiple collaborative supervision patterns in this method is obviously short, which shows that the pattern recognition efficiency of this method is high.

TABLE 1: Effectiveness of multiple collaborative supervision patterns recognition methods within social organizations.

Iterations/ time	Recognition accuracy of multiple collaborative supervision patterns (%)			
	Multiscale cluster analysis method	Multidimensional feature fusion method	Kernel density clustering method	Data clustering algorithm
50	67.65	65.67	54.55	97.45
100	69.85	69.64	58.54	89.98
150	71.65	70.30	59.32	93.32
200	77.46	73.39	60.76	95.54
250	74.31	72.53	67.54	97.42
300	66.22	73.35	68.34	96.43

TABLE 2: Identification time of multiple collaborative supervision modes within social organizations.

Iterations/ time	Time for recognition of multiple collaborative supervision patterns			
	Multiscale cluster analysis method	Multidimensional feature fusion method	Kernel density clustering method	Data clustering algorithm
50	32.50	38.76	36.54	12.54
100	57.75	60.60	54.56	17.73
150	89.75	85.54	86.63	21.65
200	129.43	98.62	99.54	26.89
250	154.54	110.53	102.43	32.53
300	186.78	143.43	132.43	36.43

6. Conclusion

This paper proposes a recognition method of multiple collaborative supervision patterns within social organizations based on data clustering algorithm. Firstly, it analyzes the characteristics and functions of social organizations and gives the definition of social organizations. Secondly, it analyzes the failure of internal supervision of social organizations and determines the internal governance elements of social organizations. Finally, the data clustering algorithm is introduced to realize the pattern recognition of multiple collaborative supervision within social organizations. The following conclusions are drawn through experiments:

(i) When the number of experimental iterations is 150, the accuracy of multivariate collaborative supervision pattern recognition of data clustering algorithm is as high as 93.32%. This shows that the recognition effectiveness of this method is better.

(ii) When the number of iterations is 300, the time of multivariate collaborative supervision pattern recognition of data clustering algorithm is 36.43 s, which shows that the pattern recognition efficiency of this method is high.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

References

[1] W. Yun, "Improved simulation of large-scale hybrid network database fuzzy query algorithm," *Computer Simulation*, vol. 37, no. 5, pp. 251–254, 2020.

[2] Y. Liu, Y. Wang, and H. Liu, "Study on temporal distribution of precipitation in Beijing city during flood period based on dynamic cluster analysis and fuzzy pattern recognition," *Journal of China Hydrology*, vol. 39, no. 1, pp. 74–77, 2019.

[3] T.-h. Zhang, D. U. Xin-hui, and S. Wang, "Research on refinement recognition algorithm of power load model based on kernel density clustering," *Mathematics in Practice and Theory*, vol. 49, no. 8, pp. 155–164, 2019.

[4] W. Fan and N. Bouguila, "Spherical data clustering and feature selection through nonparametric Bayesian mixture models with von Mises distributions," *Engineering Applications of Artificial Intelligence*, vol. 94, no. 4, pp. 773–781, 2020.

[5] X. Liu, J. Lu, and Q. Zhou, "The research of pattern recognition of heterogeneous residential power consumption based on multi-dimensional features," *Power Demand Side Management*, vol. 128, no. 6, pp. 95–100, 2020.

[6] A. Yang, "Deep data mining and trend analysis of students' teaching evaluation based on multi-scale cluster analysis," *China University Teaching*, vol. 1, no. 12, pp. 65–68, 2019.

[7] M. Gong, F. Wang, and W. Liu, "Pattern recognition receptor-mediated innate immune responses in seminal vesicle epithelial cell and their impacts on cellular function," *Biology of Reproduction*, vol. 12, no. 4, pp. 4–16, 2019.

[8] C. S. Eubanks and A. E. Hargrove, "RNA structural differentiation: opportunities with pattern recognition," *Biochemistry*, vol. 58, no. 4, pp. 199–213, 2019.

[9] M. Luo, L. Yang, Z.-a. Wang et al., "A novel C-type lectin with microbiostatic and immune regulatory functions from Litopenaeus vannamei," *Fish & Shellfish Immunology*, vol. 93, no. 21, pp. 361–368, 2019.

[10] N. Qin, H. Sun, and M. Lu, "A single von Willebrand factor C-domain protein acts as an extracellular pattern-recognition receptor in the river prawn Macrobrachium nipponense," *Journal of Biological Chemistry*, vol. 13, no. 21, pp. 332–346, 2020.

[11] C. Li, B. Li, and D. Ye, "Analysis and identification of rice adulteration using terahertz spectroscopy and pattern recognition algorithms," *IEEE Access*, vol. 13, no. 99, pp. 1–17, 2020.

[12] L. Pérez-Alós, R. Bayarri-Olmos, and M. Skjoedt, "Combining MAP-1:CD35 or MAP-1:CD55 fusion proteins with pattern-recognition molecules as novel targeted modulators of the complement cascade," *The FASEB Journal*, vol. 33, no. 11, pp. 143–197, 2019.

[13] D. Dinler, M. K. Tural, and N. E. Ozdemirel, "Centroid based tree-structured data clustering using vertex/edge overlap and graph edit distance," *Annals of Operations Research*, vol. 16, no. 23, pp. 289–299, 2020.

[14] W. Liang, K.-C. Li, J. Long, X. Kui, and A. Y. Zomaya, "An industrial network intrusion detection algorithm based on multifeature data clustering optimization model," *IEEE Transactions on Industrial Informatics*, vol. 16, no. 3, pp. 2063–2071, 2020.

[15] X. You, T. Sun, and D. Sun, "K-ear: extracting data access periodic characteristics for energy-aware data clustering and storing in cloud storage systems," *Concurrency and Computation: Practice and Experience*, vol. 14, no. 9, pp. 54–69, 2020.

[16] R. Li, J. Guan, and S. Zhou, "Single-cell RNA-seq data clustering: a survey with performance comparison study," *Journal of Bioinformatics and Computational Biology*, vol. 67, no. 76, pp. 876–883, 2020.

[17] S. Kim, C. Kang, and C. Park, "Cardinality compensation method based on information-weighted consensus filter using data clustering for multi-target tracking," *Chinese Journal of Aeronautics*, vol. 32, no. 9, pp. 66–78, 2019.

[18] X. Yang and J. Chen, "Application of multi-relational data clustering algorithm in Internet public opinion pre-warning on emergent," *Research on International English Education*, no. 1, pp. 16–19, 2019.

[19] D. K. Kotary and S. J. Nanda, "Distributed robust data clustering in wireless sensor networks using diffusion moth flame optimization," *Engineering Applications of Artificial Intelligence*, vol. 87, no. 7, pp. 103342.1–103342.21, 2020.