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Research Article

Accounting and Financial Management Cost Accounting Integrating Rough Set Knowledge Recognition Algorithm

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The main difference between rough set theory and some methods of uncertainty theory, such as probabilistic data mining, fuzzy set theory, and evidence-based data mining, is that they do not require any prior knowledge beyond the data set being processed. This is also its advantage. At present, rough set theory has been well applied in artificial intelligence, knowledge discovery, pattern recognition, fault detection, and so on. According to the discovery model of classification knowledge, the attribute reduction of decision table, classification rule reduction, and classification algorithm under the condition of missing attribute are discussed. It tests the effectiveness of the knowledge recognition algorithm. The effectiveness of the algorithm proposed in this article reaches 87.6%, 84.4%, 94.97%, and 96.34%.

1. Introduction

With the rapid development of science and technology and the continuous progress of human civilization, individuals on the Earth have become more and more complex, so the information describing individuals has become more and more inflated and blurred. Also, the data obtained by a system are often inaccurate due to noise during acquisition. Therefore, in the face of a large amount of information, an uncertain and imprecise environment, the process of processing this information, and the process of target recognition become increasingly difficult and important. Therefore, how to extract implicit useful knowledge from this complex environment to help people make correct decisions or classify and identify has become a concern of many scholars. Financial management is a more important and indispensable part of enterprise management. It covers every department in an enterprise or an organization and has a high promotion value for improving the overall economic benefit level of the enterprise. It plays a very important role in the financial management of enterprises.

A fuzzy rough set is an extension of a rough set. By introducing fuzzy sets, it enables the attribute values of the target to be fuzzified rather than discretized using the relevant fuzzy theory. The fuzzification process preserves the differences in the original attribute values. Therefore, fuzzy rough sets can deal with uncertain and fuzzy information data more effectively. Compared with rough sets, the reduction and decision rules of the original database obtained by fuzzy rough set analysis and processing have higher accuracy.

Regarding rough sets, related scientists have made the following research. Ju describes a new cost-aware coarse-graining model that uses a multiple granularity approach. He constructed a lower- and upper-cost-aware method with multiple granularities and showed that in the multiple granularity framework, the data granularity and method are sensitive to decision and testing costs [1]. Ge uses the 13-moment eigenvalues retained by the rough set feature selection algorithm as input variables. It has the same computational error and recognition rate with reduced computational time steps [2]. She extends previous research on rough sets in two ways. He extended previous research from single particle to multi-particle, studying multi-granularity rough set theory from the perspective of three-way decision. He proposed a five-valued semantics for a multilinear rough set model generating a nondeterministic matrix [3]. Hu proposed a set method based on

rough set theory for incremental rough clustering. The quality of the final solution depends somewhat on the size of the set, and the parameter settings are reasonable to achieve the coarse approximation. The proposed method is robust to various conditions of rigid clustering [4]. Dev suggests that color channel selection is important for the accurate sky and cloud segmentation in images from ground-based cameras. He suggested using the approximate amount of visible light in the images to select the color channels. His proposed method evaluates the contribution of color channels to segmentation and determines the most efficient channel [5]. Singh introduced a technique based on rough set theory to model these symbolic representations. He provides an intuitive insight into the imprecise and imperfect knowledge of criminals. He has achieved good results in viewing sketch databases and forensic sketch databases [6]. Ji proposed a robust modified Gaussian mixture model with coarse theory for image segmentation. He compared the algorithm with synthetic and real image segmentation methods to demonstrate the superior performance of the proposed algorithm [7]. Azar proposes an improved coarse set-based predecessor for medical data classification. Coarse set priors can be used to process regular features. He proposed a method for applying dominance-based rough sets to ordered features. A dominance-corrected rough population results in higher accuracy [8]. Lee introduced the conceptual framework of the "relative value trading system." The framework focuses on the data characteristics of the currency futures market using correlation analysis and proxy analysis. The results of the experiments and analysis show that the correlation coefficient of currency pairs should be taken into account when developing a robust and profitable VR trading system in the currency futures market [9]. Kang proposes a grey stack with variable accuracy and variable precision. He further builds multiple granular structures by using grey relational relationships and then employs thresholds to control the number of satisfying conditions [10, 11]. Hao proposed an automatic detection model based on the theory of rough quantization, which takes into account the information in the field data. The simulations show that the proposed data-driven car detection model satisfactorily simulates the behavior of car detectors operating in micro-traffic [12]. Fan has introduced a new model for rough sets, which is called the maximum solution model for rough sets. Theoretical analysis and experimental results show that the algorithm can efficiently remove most redundant features without degrading the classification accuracy [13]. Diker proposed a method for fuzzy rough set models that uses a fuzzy version of the unit structure function. He defined fuzzy unit operations on fuzzy networks. It is found that the approximations of two different fuzzy rough set models together form two different Galois relations [14]. Zhu proposed a new element reduction criterion to select the lowest element. Moreover, the better performance of the corresponding algorithm in learning rough sets is maintained to some extent. Rough sets are an effective tool for estimating marginal and joint probability distributions of functions using mutual information[15]. He applied the cluster correlation analysis method to the indicators and then the rough series method to determine the weights of the extracted principal components. The results show that the weighting method based on rough series theory and principal component analysis is more reasonable and objective. Finally, some suggestions are made to promote the development of clean energy [16]. These methods provide some references for the research, but due to the short time and small sample size of the relevant research, the research has not been recognized by the public.

The innovation of this article is that the concepts related to rough sets are described using equivalence relation for classical information systems. It then proposes an attribute restoration algorithm based on an equivalence matrix to reduce the information matrix and decision matrix. In the case of fuzzy information and fuzzy decision matrices, it defines the concepts of upper approximation and lower approximation and the meaning of fuzzy functions and fuzzy matrix functions. It proposes an algorithm for function reduction and uses the UCI database to demonstrate the applicability of the algorithm [17, 18].

2. Accounting and Financial Management Costing Methods

2.1. Rough Sets. Rough set theory mainly uses the relationships derived from conditional attributes, such as similarity, correlation, proximity, and ambiguity, to complete data. It also uses the granulation results to evaluate the target concept for other purposes. It then minimizes the data model by selecting conditional attributes for different application purposes. It also captures the best or strongest representation of the data to simplify the problem and increase the efficiency [19].

Theories that can effectively deal with inaccurate, imprecise, and incomplete data analysis can be incorporated into artificial intelligence theory. It is able to discover knowledge in data with uncertainty and even in noisy data. By defining a lower approximation set with certain attribution and an upper approximation set containing uncertainty, it can better describe the boundary problem with ambiguity. In the objective world, the relationship between objects and classes is not a simple oppositional relationship of either black or white. Some objects do not necessarily belong to a certain class. It may belong to multiple classes at the same time.

Rough set theory mainly uses information systems to clearly represent the structure of data and mine the implicit knowledge.

$$E_B = \{(m,n) \in U \times U\colon\ x(m) = x(n), \forall x \in B\}, \tag{1}$$

where U is the collection of non-empty finite objects and E_B is the equivalence relation.

$$[m]_B = \{n \in U\colon\ (m,n) \in E_B\}, \tag{2}$$

where $[m]_B$ is the basic set or basic concept.

$$\begin{aligned}\overline{E}_B(M) &= \{m \in U:\ [m]_B \cap m \neq 0\} \\ &= \cup\{[m]_B:\ [m]_B \cap M \neq 0\}, \\ \underline{E_B}(M) &= \{m \in U:\ [m]_B \subseteq M\} = \cup\{[m]_B:\ [m]_B \subseteq M\},\end{aligned} \tag{3}$$

where $\overline{E}_B(M)$ is the upper approximation set and $\underline{E_B}(M)$ is the lower approximation set.

$$E_S = \{(m,n) \in U \times U:\ s(m) = s(n), \forall s \in S\}, \tag{4}$$

where E_s is the decision class and$S$ is the positive domain coordination set.

$$c(M,N) = \begin{cases} 1 - \dfrac{|M \cap N|}{|M|}, & |M| > 0, \\ 0, & |M| = 0, \end{cases} \tag{5}$$

where M, N are nonempty subsets of finite universes, $|M|$ is the cardinality of the set, and $c(M,N)$ is the relative misclassification rate.

$$\begin{aligned}BD_B^{\varepsilon}(M) &= \cup\{[m]_B:\ \varepsilon < c([m]_B, M) < 1-\varepsilon\}, \\ NG_B^{\varepsilon}(M) &= \cup\{[m]_B:\ c([m]_B, M) \geq 1-\varepsilon\},\end{aligned} \tag{6}$$

where $BD_B^{\varepsilon}(M)$ is the boundary domain and $NG_B^{\varepsilon}(M)$ is the negative field.

$$C_B(m_1) = \{p_1, p_2, p_3\}, \tau_B(m_1) = \psi, \tag{7}$$

where $C_B(m_1)$ is the rough decision function and $\tau_B(m_1)$ is the fine decision function.

$$\begin{aligned}\overline{MR_B}(M) &= \underset{m \in M}{\cup} C_B(m) = \{p_u:\ \exists m \in M, [m]_B \cap W_u \neq 0\}, \\ \underline{MR_B}(M) &= \underset{m \in M}{\cap} \tau_B(m) = \{p_u:\ \exists m \in M, [m]_B \in W_u\},\end{aligned} \tag{8}$$

where $\overline{MR_B}(M)$ is the approximate on the mark, $\underline{MR_B}(M)$ is the approximate under the mark, and E_i is the tag information collection.

$$\begin{aligned}C_B^{\varepsilon}(m) &= \left\{p_u:\ m \in \overline{E_B^{\varepsilon}}(W_u)\right\} = \{p_u:\ c([m]_B, W_u) < 1-\varepsilon\}, \\ \tau_B^{\varepsilon} &= \{p_u:\ m \in E_B^{\varepsilon}(W_u)\} = (p_u:\ c([m]_B, W_u) \leq \varepsilon),\end{aligned} \tag{9}$$

where $c([m]_B, W_u)$ is the relative misclassification rate, $C_B^{\varepsilon}(m)$ is the generalized rough decision function, and τ_B^{ε} is the generalized fine decision function.

$$\varsigma_P(B_1) = \frac{\mu}{\sum_{m \in U}\left|C_{B_1}(m)\right|} \leq \frac{\sum_{m \in U}\left|\tau_{B_2}(m)\right| + \phi(B_2)}{\sum_{m \in U}\left|C_{B_2}(m)\right|}, \tag{10}$$

where $\varsigma_P(B_1)$ is the number of conditional attributes.

$$\tau_B^{\varepsilon}(M) = \frac{\left|MR_B^{\varepsilon}(M)\right|}{|P|}, \tag{11}$$

where ε is the misclassification rate and $\tau_B^{\varepsilon}(M)$ is the marking quality of the collection.

$$\tau_P^{\varepsilon}(B) = \frac{\sum_{u=1}^{D}\left|MR_B^{\varepsilon}(M_u)\right|}{d(P)}, \tag{12}$$

where $\tau_P^{\varepsilon}(B)$ is the mark approximate mass and B is the condition attribute set.

$$S_1\left(\frac{M}{Z}\right) = \frac{\sum_{u=1}^{b}\left|M_u \cap Z_u\right|}{\sum_{u=1}^{b}\left|Z_u\right|}, \tag{13}$$

where $S_1(M/Z)$ is the inclusiveness.

$$\varsigma_P(B) = \frac{\sum_{u=1}^{D}\left|\underline{M_u PE_B}(M_u)\right| + \varphi(B)}{\sum_{u=1}^{b}\left|M_u\right|\left|\underline{M_u PE_B}(M_u)\right|}, \tag{14}$$

where $\varsigma_P(B)$ is the mark dependency.

$$\begin{aligned}\tau_P^{\varepsilon}(B) &= \frac{\sum_{u=1}^{D}\left|\underline{MR_B^{\varepsilon}}(M_u)\right|}{d|P|}, \\ \omega_B(M) &= 1 - \delta_B(M) = 1 - S_0\left(\frac{\underline{\underline{MR_B}}(M)}{\overline{\overline{MR_B}}(M)}\right),\end{aligned} \tag{15}$$

where $\tau_P^{\varepsilon}(B)$ is the mark approximate mass and B is the condition attribute set.

Rough set theory is an effective tool to deal with various incomplete information such as imprecise, inconsistent, and incomplete. On the one hand, it benefits from its mature mathematical foundation and does not require prior knowledge. And on the other hand is its ease of use. Because the purpose of creating rough set theory and the starting point of research is to analyze and reason directly on the data. It discovers hidden knowledge and reveals potential laws. Therefore, it is a natural data mining or knowledge discovery method. It is compared with other methods of dealing with uncertain problems, such as data mining methods based on probability theory, data mining methods based on fuzzy theory, and data mining methods based on evidence theory.

Rough set theory is based on a classification process. It understands classification as an equivalence relation within a given space, which forms a spatial division. A rough set understands information to share data, and each shared set is called a concept. The main idea of rough set theory is to use a known database. It describes inaccurate or uncertain data with data from known databases.

The most significant differences between this theory and other theories dealing with uncertain and imprecise problems are: it does not need to provide any prior information beyond the set of data the problem needs to deal with. Therefore, the description or treatment of the uncertainty of the problem can be said to be relatively objective. This theory fails to include mechanisms for dealing with imprecise or uncertain raw data. So, this theory is highly complementary to other theories dealing with uncertainty or imprecision, such as probability theory, fuzzy mathematics, and evidence theory.

Rough sets use decision tables as the basic data representation. It is based on the classification mechanism. It understands the classification as the division of the analects

in a specific space by using the equivalence relationship, which is the ability to classify objects. In the existing decision table, different attributes play different roles in the process of knowledge acquisition. Some attributes may play a key role in the acquisition of knowledge, while others may be redundant. The existence of such redundant information not only wastes resources but also interferes with people to make correct and concise decisions. The rough set classification knowledge discovery model mainly includes the following steps:

(1) Modeling data acquisition. The so-called modeling data in the model include a training data set for model establishment and a test data set for model accuracy testing. There are two principles when selecting modeling data: comprehensiveness of data and validity of data. Comprehensiveness of data means that the data are derived from the entire scope of the model's use rather than a local scope. The validity of data means that all possibilities can be fully and effectively reflected through these data.

(2) Data preprocessing. Data preprocessing refers to the transformation of data into the form of decision expression. Its purpose is to reduce the difficulty and complexity of rough set classification knowledge acquisition and to improve the quality and effect of knowledge discovery.

(3) Attribute reduction. The attribute reduction is to destroy irrelevant information given the classification capability of the information sorting library. Since the downgrade process has a large impact on the downgraded asset valuation rules, similar valuation rules are rarely taken into account.

(4) The classification rules are reduced. It obtains useful rules in the field by analyzing a sample data set or database. The regular knowledge pattern obtains the decision rules from the decision information system. After attribute reduction of a decision table, as shown in Figure 1, it is a recognition framework based on fuzzy rough sets.

The concept of "knowledge" has many different meanings in different categories. In rough set theory, "knowledge" is considered as a classification ability. Human behavior is based on the ability to distinguish between real or abstract objects. For example, in ancient times, in order to survive, people must be able to distinguish between what is edible and what is not edible. When a doctor diagnoses a patient, he must identify which disease the patient has. These abilities to classify things according to their characteristics can be regarded as some kind of "knowledge."

During the classification process, individuals with similar differences are placed in the same category. Their relationship is an indistinguishable relationship. It assumes that only two black and white colors are used to separate objects in space into two categories: black objects and white objects. Then two objects that are both black are indistinguishable. Because the information describing their characteristic attributes is the same, they are all

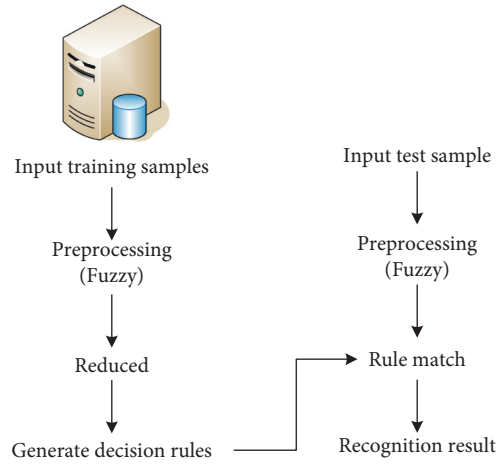

Figure 1: A recognition framework based on fuzzy rough sets.

black. If the attributes of squares and circles are introduced, the objects can be further divided into four categories: black square objects, black round objects, white square objects, and white round objects. At this time, if the two objects are both black, they are still indistinguishable. An indistinguishable relation is an equivalence relation. The indistinguishable relationship between two white round objects can be understood as their equivalent relationship under the two attributes of white and circle. The basic set is defined as a set composed of objects that are indistinguishable from each other in the universe, and it is the particles that make up the knowledge of the universe. The concept of indistinguishable relations is very important in rough set theory. It profoundly reveals the granular structure of knowledge. It is the basis for defining other concepts. Knowledge can be thought of as a family of equivalence relations. It splits the universe into a series of equivalent classes.

In a rough set, discretization is required for each continuous attribute. Discretization selects discrete breakpoints and then uses the breakpoints to divide the value range of the attribute into several subintervals. The resulting subintervals are finally mapped into several different exact variables, such as numbers 1, 2, 3, and so on. Therefore, the attribute values belonging to a subinterval are also replaced by the exact variables corresponding to the interval. It can be seen that the discretization process does not well preserve the differences and similarities between the original attribute values. Figure 2 shows the process of fuzzing a single attribute.

The simple utility of rough set methods is surprising. It can be quickly applied within a short time after its creation because of the following characteristics. It can handle all kinds of data, including incomplete data and data with many variables. It handles data imprecision and ambiguity, both deterministic and nondeterministic. It can obtain the minimum expression of knowledge and various granular levels of knowledge. It can reveal conceptually simple, easy-to-manipulate patterns from data. It can generate precise and easy to check and verify rules, especially suitable for the automatic generation of rules in intelligent control.

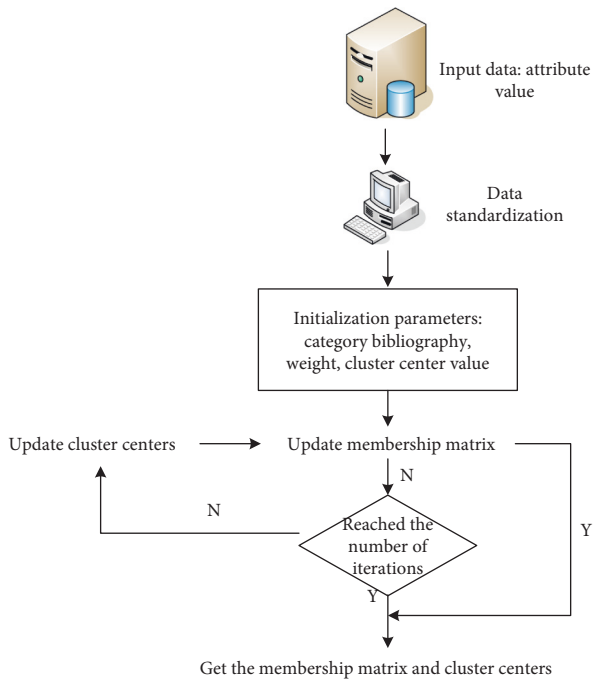

Figure 2: The process of fuzzing a single attribute.

Rough sets can effectively deal with the following problems: expression of uncertain or imprecise knowledge; empirical learning and acquisition of knowledge from experience; analysis of inconsistent information; uncertain, incomplete intellectual reasoning; data reduction while preserving information; and identifies and evaluates dependencies between data.

2.2. Accounting and Financial Management Costing. Accounting is mainly based on the accrual basis, and the unit of measurement is currency. Based on the actual transactions of enterprises and institutions, it makes accounting entries, completes accounting records, and prepares accounting statements and financial statements. Accounting is the recording, measurement, and communication of transactions and events of enterprises and institutions. The use of fictitious transactions and financial data in accounting is prohibited regardless of the institution. The main purpose of accounting is to present the financial position, performance, and cash flow of businesses and institutions. It also oversees the financial activities and income and expenditure of businesses and institutions. The basis of financial management is the objective existence of economic activities and economic relations. It is linked to the development of business and institutional activities. Financial management refers to organizing financial activities and managing financial relationships with various departments of a business or institution. Financial management is the management of value. It includes the financial activities of all enterprises and institutions and controls the entire financial work.

Accounting differs from financial management in its goals. The end result of accounting is the company's financial statements. They provide accounting information about the financial position, results, and cash flow of a business to those who use them and reflect the fiduciary responsibilities of business managers. Managerial accounting helps those who use financial statements to make informed financial decisions. Financial management is the management of finances through business activities in a specific economic environment. According to the theory and practice of institutional financial management, the typical goals of financial management are profit maximization, unit value maximization, and stakeholder benefit maximization. As shown in Figure 3, it is a classification diagram of assets used by logistic enterprises.

Accounting systems were originally set up for accounting purposes. With the development and evolution of society, the role of accounting has also undergone significant changes. Accounting reflects the economic activities that have taken place or are taking place in an entity through quantitative changes. It provides financial information to managers of entities, primarily in the form of various types of financial statements. Accounting is a very important part of any business. No business can survive without accounting. This makes it impossible to provide complete, accurate, and systematic financial information. Accounting work should continue to standardize accounting principles and should further develop general ledger, subsidiary ledger, and general ledger. It is necessary to clarify the content of the reconciliation between the accounts and truly reflect the financial status and operating results of the institution. This makes the accounting data of public institutions reliable and provides accurate and complete financial information for financial analysis and decision-making units. If the financial statements do not contain direct misstatements, accounting, and other effects, the financial management unit does not have critical business information and financial management has no room for negotiation. Therefore, accounting records are the foundation of financial management.

Financial management is based on the actual financial position of the company. It uses accounting data to forecast, plan, manage, evaluate, and control a company's financial activities. With the development of society, the market economy has been accelerating the pace of enterprise management. As an important concept, corporate financial management has become the consensus of everyone. Financial management is the life guarantee of enterprises and institutions, and financial management penetrates into all financial operations of institutions. Whether it is raising, spending, or distributing money, it is all about financial management, because all aspects of an institution's operation require financial aspects and controls. Since financial management is directly related to the survival and development of an enterprise, its core role in an enterprise is a realistic need and an objective requirement. Accounting is a form of expression. It displays an organization's business processes and results in the form of data. Financial accounting uses data from a business' financial statements and provides a specific method for systematically analyzing and

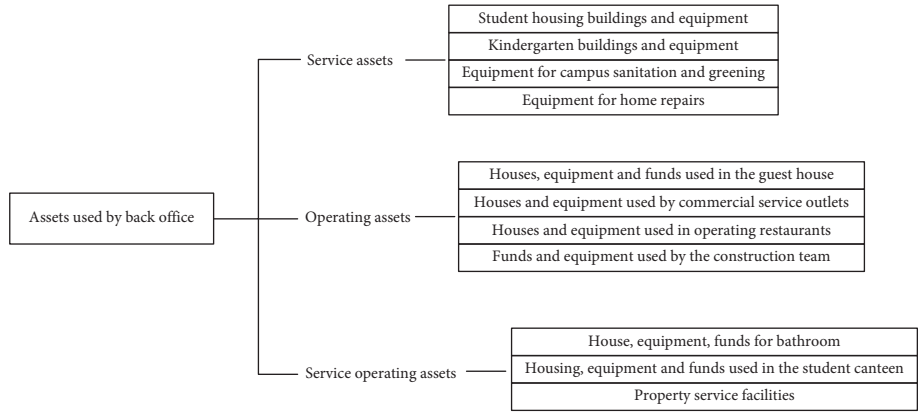

Figure 3: Classification diagram of assets used by logistic enterprises.

evaluating a business' financial management and performance. It provides insight into a company's profits and losses and future growth trends. This in turn provides important financial information for the financial management of the company and for making better financial decisions. Financial personnel should have high financial knowledge. This is the new financial management requirements for financial personnel. Enterprises should train and implement high-quality financial management personnel. Only in this way, enterprises can strictly implement the management of excess liquidity of enterprises in their daily work. This will facilitate the implementation of investment activities by enterprises. As shown in Figure 4, it is a business use case diagram of the financial management cost accounting system.

For small and medium-sized manufacturing enterprises, the simple general ledger module can no longer satisfy the detailed financial cost accounting. It can be combined with the introduction of a comprehensive budget management system or can enable the ready-to-use modules in the existing financial software. This makes the ERP system perfectly interpret and make the best use of it. In financial cost management, capital operation is the main line, and liquidity is the core assessment objective. It is related to various capability indicators of the enterprise. Accounting focuses on the accumulated profits in each period, while financial cost management looks at the value of various ratios. A comprehensive budget management system can integrate human, material, and financial information. It then forms a system for various cost accounting indicators such as procurement, production, sales, profitability, and cash flow. It realizes overall management and control, so that all departments and links within the enterprise can make overall planning and coordinate actions.

3. Accounting and Financial Management Costing Experiment

The knowledge in the database is not equally important and some information is redundant. The purpose of the so-called feature simplification is to remove irrelevant information from the database without affecting its categorizability. Since

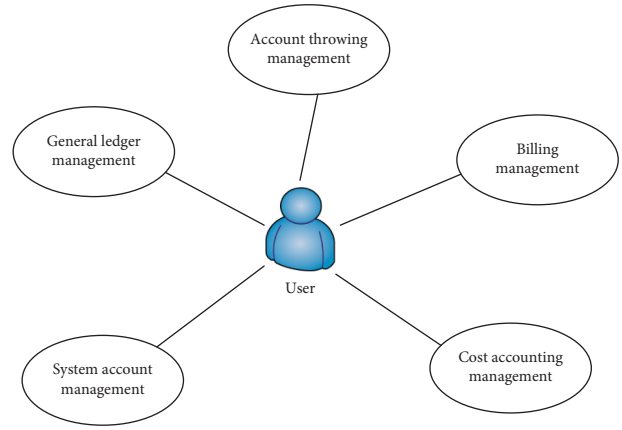

Figure 4: Business use case diagram of financial management costing system.

the process of feature simplification has a great influence on the classification rules, the number of features is reduced, and the corresponding classification rules consider less factors. If several simplifications have the same minimum number of eigenvalues, an optimal simplification is obtained. The simplification scheme with the smallest number of eigenvalues is called the best simplification scheme. Figure 5 shows the structure of the knowledge recognition system.

In order to verify the properties and some theorems of the variable multi-granularity coarse sugar set, three data sets were selected for simulation experiments, as shown in Table 1 for data description.

It is assumed that the decision attribute of the data set Dergy divides its own 376 samples into 4 decision classes and selects a subset of conditional attribute sets. It calculates the multi-granularity correlation approximation separately as shown in Table 2.

In the same way, the Tic and Zo data sets are processed in the same way, and the multi-granularity correlation approximations are obtained, as shown in Tables 3 and 4.

In order to verify the effectiveness of the method, a method to verify the effect of attribute reduction using the recognition accuracy of the classifier is given, and the recognition results of the support vector machine are shown in Figure 6.

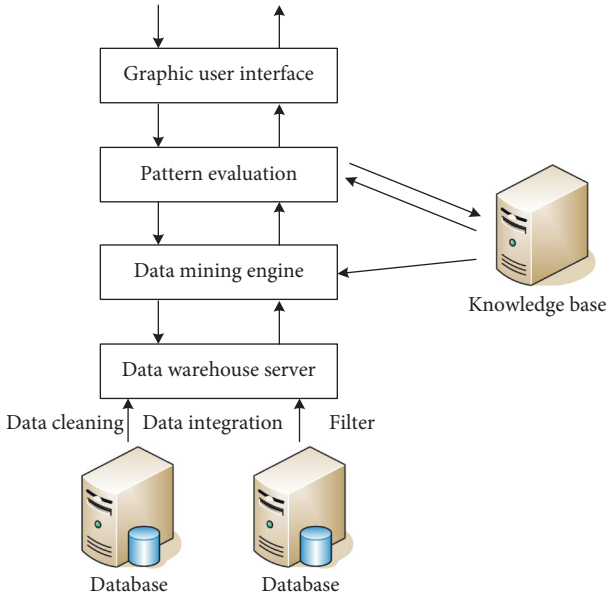

Figure 5: Knowledge recognition system structure.

It can be seen from the figure that the attribute subset selected by the method in this article obtains a classification accuracy that is almost the same as that of the unreduced data set of the full set of attributes. This shows that the redundant attributes of the data set cannot increase the classification of the data set.

It uses a completely disjoint test set and training set to test the effectiveness of the knowledge recognition algorithm. Each group of experiments was carried out 100 times, and the experimental results were taken as the average value of each experiment. The experimental results are shown in Figures 7(a) and 7(b).

It can be seen from the figure that among various training series, the classification accuracy of the method is the highest. The effectiveness of the knowledge recognition algorithm was tested, and the effectiveness of the algorithm proposed in this article reached 87.6%, 84.4%, 94.97%, and 96.34%. This shows that the method proposed in this article has the potential to transform general data into almost continuous values for decision information systems. When classical mass methods involve continuous-valued properties, an analysis must be performed first. But the separation method does not consider the influence of specific conditions on the classification ability of properties. Data collection methods are independent. This will result in data loss during the discretization process.

Each department entity is regarded as a cost center, and the financial management department is regarded as a forecast supervision center. The head office controls production and sales and is responsible for both costs and revenue. It has the responsibility center with all the business decision-making power. Internal entities are the responsibility centers that do not generate or assess revenue, but focus on assessing the costs and expenses incurred. The financial department is the responsibility center for making financial forecasts, supervising, and evaluating the cost control of internal entities. Figure 8 shows the relationship between the responsibility centers.

Table 1: Data description.

Data set	Number of samples	Condition property	Decision category
Dergy	376	35	4
Tic	960	9	2
Zo	100	17	7

Table 2: Multiple granularity correlation approximations.

Project	Decision class			
	S_1	S_2	S_3	S_4
Approximation under optimistic multi-granularity	112	52	72	41
Pessimistic multi-granularity approximation	38	2	7	5
Optimistic multi-granularity approximation	112	61	72	52
Pessimistic multi-granularity approximation	191	288	189	205

Table 3: Tic multiple granularity correlation approximations.

Project	Decision class	
	S_1	S_2
Approximation under optimistic multi-granularity	143	443
Pessimistic multi-granularity approximation	2	23
Optimistic multi-granularity approximation	515	815
Pessimistic multi-granularity approximation	935	967

Table 4: Zo multiple granularity correlation approximations.

Project	Decision class			
	S_1	S_2	S_3	S_4
Approximation under optimistic multi-granularity	41	20	3	12
Pessimistic multi-granularity approximation	13	3	2	9
Optimistic multi-granularity approximation	41	20	5	13
Pessimistic multi-granularity approximation	68	26	55	26

Experiments are carried out on two companies with the method proposed in this article. It calculated the accounting and financial management costs of the company, and the experimental results are shown in Figure 9. It can be seen from the figure that the average cost of accounting is higher than the cost of financial management, and the number of people responsible for accounting and financial management varies from company to company.

A company may have a suitable financial system. But most companies do not have an in-depth financial expense accounting system. This makes it difficult to achieve a closed loop for all system constraints. As mentioned earlier, the management of fiscal expenditure focuses on cost, time, and risk assessment. Therefore, it is necessary to improve the corresponding expenditure system, taking into account both financial investment and operation. The policies and systems that many companies adhere to date no longer support

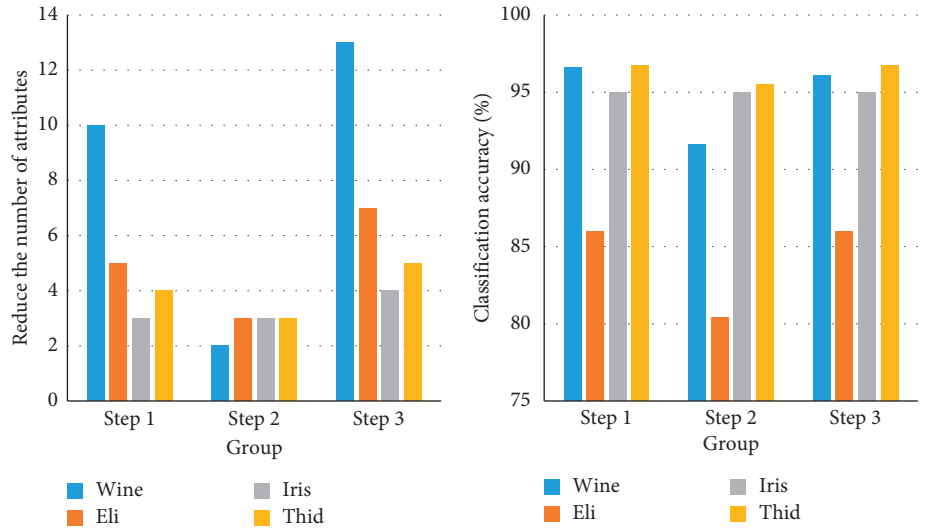

Figure 6: Support vector machine recognition results.

internal management. This seriously affects the management of corporate financing costs and continues to hinder the pace of corporate development, which must be managed by appropriate systems.

The purpose of financial management is theoretically considered to increase shareholders' assets. It is mainly aimed at listed companies. For all companies, this is generally understood as increasing the market value of the capital invested by investors. However, the income calculated in financial management is different from the income shown in the financial statement. Financial management must take into account the amount of time and the risk-benefit ratio. This is also the basic concept of financial management. Then, from the perspective of financial management, it is necessary to record the company's investment cost and capital cost in detail and always clarify the concept of "discount" and the understanding of analysis.

4. Discussion

The main focus of managing financial expenses is the potential of capital operations, and there is a lack of calculation of the company's total operating expenses. It lacks preliminary planning due to investment costs, uneven distribution of project funds, low labor costs, high capital costs, high assets and liabilities, low profit margins, and invisible profit streams. By looking at the core of each problem phenomenon, it reflects the weak link of cost accounting.

Under accounting standards, this should be sufficient for the day-to-day operations of the company. For a business to be broadly successful, it must have a well-established insurance system. Every aspect of the business needs to be linked with the proper systems, and managing financial expenses is the key to the success or failure of a business. Therefore, various cost systems need to be respected. The relevant accounting system of financial expenditure is divided into two parts: internal finance and external finance. Internal finance should strengthen the management of other commercial liabilities and stipulate the repayment period, especially the interest-bearing and transfer periods. The second is to borrow money from other parties; adjust the profits of both parties; and reduce the total tax burden, tax use, and tax risks. In the case of external financing, financing methods, capital and financing costs must be limited, and solutions and profits must be fully considered. Regarding the internal investment cost accounting system, it is necessary to improve the system, such as approval and filing of construction projects, approval and operation, adjustment and inspection, demolition and cleaning, etc. For external investments, the feasibility of conducting a proper risk assessment needs to be assessed in advance. There are similar selection criteria for computing opportunity costs, which are an indicator of institutional constraints. Critical operating cost accounting systems should be respected from the outset and appropriate systems should be supported across all product lines. In terms of materials, it optimizes the order quantity system, inventory management system, sales reduction, and other related systems, including the production process. It should also establish a common cost system, provide a standard for calculating product value by quantity, analyze cost changes, and adjust in time.

Due to individual problems in the process of enterprise establishment, departments at all levels must be established according to the needs of enterprise development. This ensures an equal distribution of rights, responsibilities, and benefits for business management during the establishment process. The three requirements identify and complement each other and promote the effective development of the company. In any institution, financial expenditure management must be manageable and reliable. The treasurer must have the authority to participate in the running of the company, not just as an informant. The division of labor among economic workers should be clear. It is necessary to set up full-time personnel and responsibilities according to the requirements of the business work, and the work cannot be confused. It incorporates the company's management

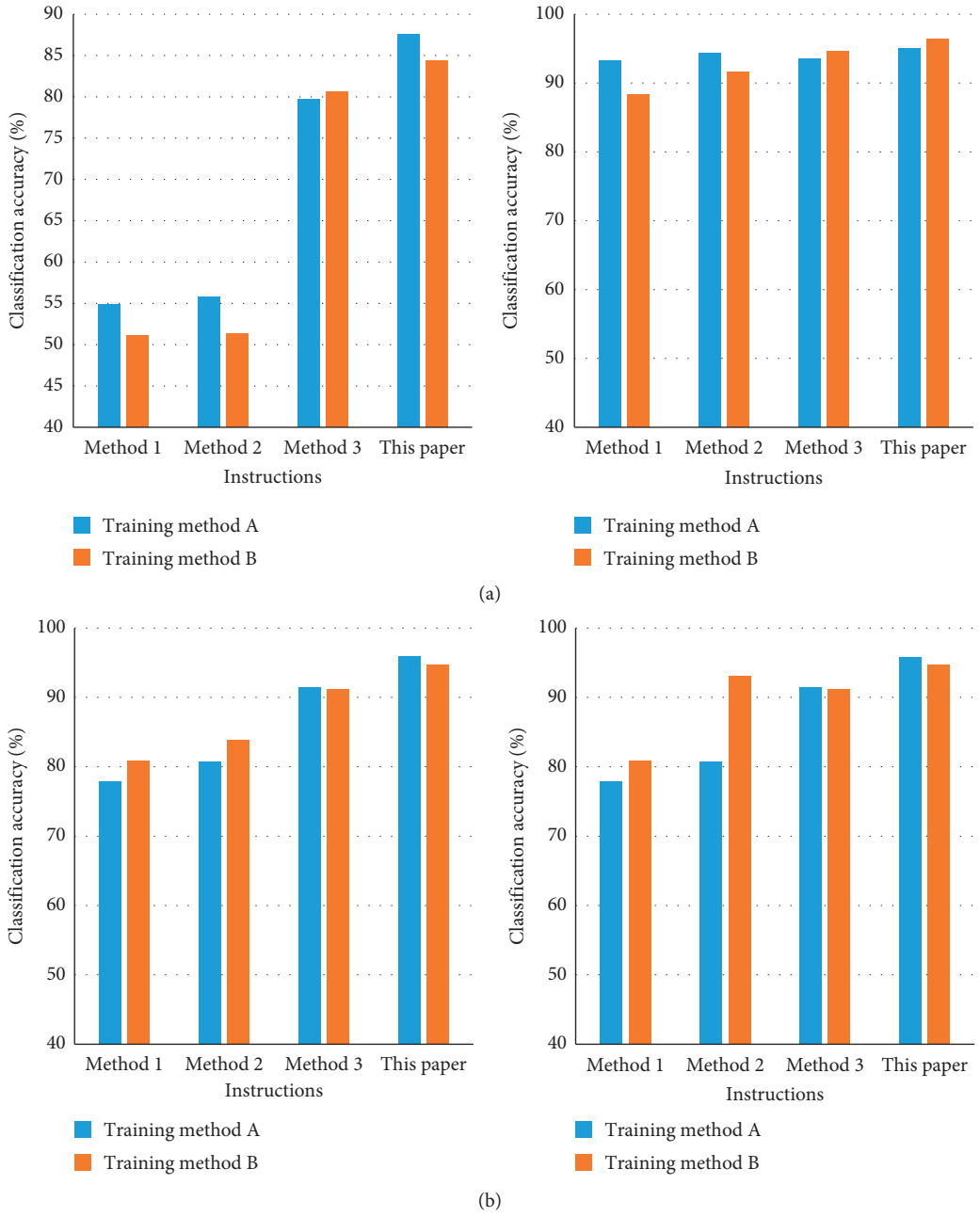

Figure 7: Experimental results on the data set.

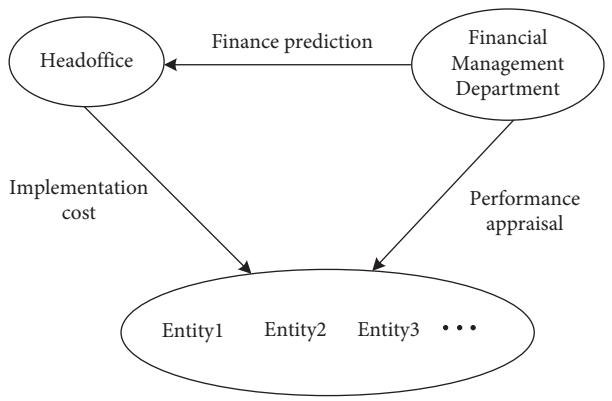

Figure 8: Diagram of the relationship between each responsibility center.

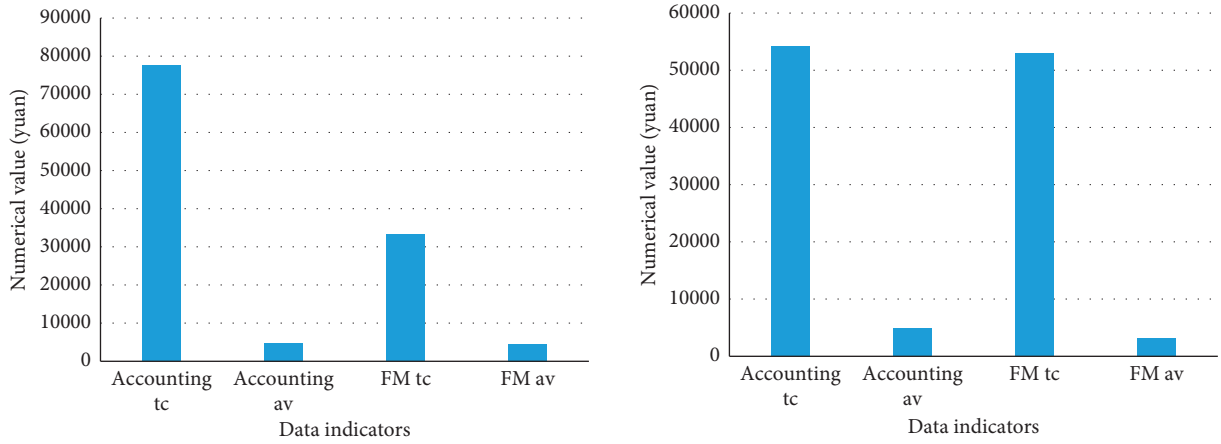

Figure 9: Experimental results.

responsibilities or departments and total operating expenses from the project plan. It is used for the implementation of specific decisions, cost analysis, and monitoring of all aspects of operation and, finally, the monitoring and evaluation of return on investment. Business leaders gain more visibility into the entire operation and can control the dynamics and control it as a whole.

5. Conclusion

Current research on rough sets usually focuses on obtaining rough set methods and their properties from different perspectives, fuzzy rough set performance, rough set attribute reduction, and rough set attribute algorithms. This article elaborates the relevant theory of rough sets and constructs a knowledge recognition system structure fuzzy rough set. Corresponding strengthening strategies are proposed for the main problems of cost accounting in the process of financial management. By improving the relevant financial cost accounting system, establishing a sound financial cost accounting system, and configuring and training comprehensive talents, the shortcomings of cost accounting can surely be solved. The new attribute importance proposed in this article is different from the conceptual thinking point of the previous definition. It is considered from the aspect of the influence of the decision attribute value on the decision table. It discriminates the importance of conditional attributes according to their defined size. However, this method is suitable for decision-making systems with multiple decision-making attribute values and will still produce relatively large errors for a single decision-making system.

The reduction result of fuzzy rough set is based on fuzzy preprocessing, so it is of great significance to study more accurate fuzzy method for the application of fuzzy rough set. Although the reduction algorithm based on conditional entropy of fuzzy rough sets proposed in this paper can find the optimal decision table, the reduction is not necessarily the smallest reduction, so it can be tried to combine with some other search methods to find the optimal solution and the smallest reduction.

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 no conflicts of interest.

References

[1] H. Ju, H. Li, X. Yang, and X. B. Zhou, "Cost-sensitive rough set: a multi-granulation approach," *Knowledge-Based Systems*, vol. 123, no. MAY1, pp. 137–153, 2017.

[2] Y. Liu, X. Yin, and B. Cao, "Variable precision rough set model and application based on grey similarity incidence relationship," *Journal of Grey System*, vol. 29, no. 3, pp. 45–57, 2017.

[3] X. Ge, J. Zhang, Y. Zhou, and J. H. H. D. M. J. Y. Cai, "Rough set neural network feature extraction and pattern recognition of shaft orbits based on the Zernike moment," *Shock and Vibration*, vol. 2021, no. 12, 11 pages, Article ID 6680640, 2021.

[4] Y. She, X. He, H. Shi, and Y. Qian, "A multiple-valued logic approach for multigranulation rough set model," *International Journal of Approximate Reasoning*, vol. 82, no. MAR, pp. 270–284, 2017.

[5] J. Hu, T. Li, C. Luo, H. Fujita, and Y. Yang, "Incremental fuzzy cluster ensemble learning based on rough set theory," *Knowledge-Based Systems*, vol. 132, no. sep.15, pp. 144–155, 2017.

[6] S. Dev, F. M. Savoy, Y. H. Lee, and S. Winkler, "Rough-set-based color channel selection," *IEEE Geoscience and Remote Sensing Letters*, vol. 14, no. 1, pp. 52–56, 2017.

[7] A. K. Singh, N. Baranwal, and G. C. Nandi, "A rough set based reasoning approach for criminal identification," *International Journal of Machine Learning and Cybernetics*, vol. 10, no. 3, pp. 413–431, 2017.

[8] Z. Ji, Y. Huang, Y. Xia, and Y. Zheng, "A robust modified Gaussian mixture model with rough set for image segmentation," *Neurocomputing*, vol. 266, no. nov.29, pp. 550–565, 2017.

[9] A. T. Azar, H. H. Inbarani, and K. Renuga Devi, "Improved dominance rough set-based classification system," *Neural Computing & Applications*, vol. 28, no. 8, pp. 2231–2246, 2017.
[10] S. Lee, D. Enke, and Y. Kim, "A relative value trading system based on a correlation and rough set analysis for the foreign exchange futures market," *Engineering Applications of Artificial Intelligence*, vol. 61, no. MAY, pp. 47–56, 2017.
[11] L. Zhang, Y. Yan, W. Xu, J. Sun, and Y. Zhang, "Carbon emission calculation and influencing factor Analysis based on industrial big data in the "double carbon" era," *Computational Intelligence and Neuroscience*, vol. 202212 pages, Article ID 2815940, 2022.
[12] Y. Kang, S. Wu, Y. Li, and J. B. Liu, "A variable precision grey-based multi-granulation rough set model and attribute reduction," *Knowledge-Based Systems*, vol. 148, no. MAY15, pp. 131–145, 2018.
[13] S. Hao, L. Yang, and Y. Shi, "Data-driven car-following model based on rough set theory," *IET Intelligent Transport Systems*, vol. 12, no. 1, pp. 49–57, 2018.
[14] X. Fan, W. Zhao, C. Wang, and Y. Huang, "Attribute reduction based on max-decision neighborhood rough set model," *Knowledge-Based Systems*, vol. 151, no. JUL.1, pp. 16–23, 2018.
[15] M. Diker, "Textures and fuzzy unit operations in rough set theory: an approach to fuzzy rough set models," *Fuzzy Sets and Systems*, vol. 336, no. APR.1, pp. 27–53, 2018.
[16] X.-Z. Zhu, W. Zhu, and X.-N. Fan, "Rough set methods in feature selection via submodular function," *Soft Computing*, vol. 21, no. 13, pp. 3699–3711, 2017.
[17] Y. He, Y. Pang, Q. Zhang, and Z. Q. Jiao, "Comprehensive evaluation of regional clean energy development levels based on principal component analysis and rough set theory," *Renewable Energy*, vol. 122, no. JUL, pp. 643–653, 2018.
[18] Z. Zhang and D. Li, "Multi-label algorithm based on rough set of fractal dimension attribute," *The Journal of Supercomputing*, vol. 76, no. 2, pp. 1105–1115, 2020.
[19] S. F. Farahbakhshian and M. T. Ahvanooey, "A new gene selection algorithm using fuzzy-rough set theory for tumor classification," *Control Engineering and Applied Informatics*, vol. 22, no. No.1, pp. 14–23, 2020.