Research Article

Improved Nearest Neighbor Propagation Algorithm Based on Internet of Things Technology in Financial Management Early Warning

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In recent years, the increasing degree of economic globalization has provided a broader platform for the development of enterprises, but it also made enterprises bear more and more pressure of market competition. This paper mainly studies the application of improved nearest neighbor propagation algorithm based on Internet of Things technology in financial management early warning. This paper selects the mixed unbalanced panel data of 40 companies from 2006 to 2008 as the overall research sample. After eliminating the outliers and the samples of companies without data for two consecutive years, 390 datasets of 30 companies are selected as the modeling samples. The selection of risk early warning indicators should follow the following six principles: comprehensiveness, importance, scientificity, objective quantification, comparability, and operability. The standard deviation of index data is calculated to compare the strength and improve the integrity and effectiveness of the value. In this paper, Delphi expert analysis method is used to invite experts who have certain research in this field to propose the corresponding independent evaluation index scheme. On the premise of taking the summary results as the reference, the index contents which are not representative and different from the actual requirements are deleted, so as to finally determine the index system of the risk assessment scheme. The data show that the final correct rate of the financial risk early warning model can reach 91% and the total number of judgments is 200, where 182 are correct and only 18 are wrong. The results show that the establishment of a good financial risk early warning system can help enterprises better find and deal with risks and makes enterprises develop healthily.

1. Introduction

In recent years, the process of global economic integration has been advancing. In order to enhance the driving force of business development, companies must integrate information and effectively build a financial risk early warning management mechanism. Only by fundamentally improving their own management level and risk control capabilities can they maintain the power of the company’s production and development on the basis of following the control mode of the financial management center and achieve sustainable development.

The establishment of a financial early warning system by itself cannot prevent enterprises from experiencing performance declines and survival failures. Its significance lies in the establishment of a long-term active learning environment change mechanism through the adaptive learning mechanism of financial early warning, continuous improvement of learning level, and response to environmental changes. It has adaptive adjustment capabilities; the early warning mechanism of adaptive learning is established in the decision-making system of financial rigid control, which reflects the decision-making characteristics of people’s active knowledge as the core. Environmental learning ability and adaptive adjustment ability determine the effectiveness of early warning management the essential.

The Internet of Things technology has greatly reduced the threshold for equipment information acquisition and networking interaction, providing a technical foundation for the Internet of Everything. Ni et al. believe that the Internet of Things (IoT) allows the connection of billions of physical objects to collect and exchange data to provide various
applications such as environmental monitoring, infrastructure management, and home automation. To support these features, fog computing is integrated into the Internet of Things, and computing, storage, and network resources are extended to the edge of the network. They reviewed the architecture and characteristics of fog computing and studied the key roles of fog nodes, including real-time services, instantaneous storage, data distribution, and decentralized computing. They also studied fog-assisted IoT applications based on different roles of fog nodes. Then, they raised the security and privacy threats of IoT applications and discussed the security and privacy requirements in fog computing. In addition, they also demonstrated the potential challenges of protecting fog computing and reviewed the latest solutions to solve the security and privacy issues of fog computing in IoT applications. Although their research is relatively comprehensive, it lacks specific practical operations [1]. Li et al. believe that building information modeling (BIM) is a useful tool to facilitate prefabricated construction on-site assembly services (OAS) because it facilitates strong management of physical and functional digital presentations. They analyzed the needs of stakeholders, defined and designed smart construction objects (SCOs) and smart gateways, and designed the use of radio frequency identification (RFID) technology to collect data in real time during the assembly process of prefabricated construction sites. They used BIM and virtual reality (VR) technologies to develop visibility and traceability functions. Although their design can improve the efficiency of the precast construction site, the data collection is not accurate [2]. Abdel-Basset et al. believe that traditional supply chains are facing problems such as uncertainty, cost, complexity, and vulnerability. To overcome these problems, the supply chain must be more intelligent. They use radio frequency identification (RFID) technology to track the product process at all stages of the supply chain management. At each stage of supply chain management, each product is attached to an RFID tag and scanned by an RFID reader and ESP8266. After scanning the tags, they store the tag ID in the database. All information about the product will be entered by the supplier and then uploaded to the manager. In order to evaluate the safety standards of the proposed supply chain management system, they also proposed a framework that combines the neutral decision-making experiment and evaluation laboratory (N-DEMATEL) technology with the analytic hierarchy process (AHP). In order to effectively deal with vague, uncertain, and incomplete information, they proposed the DEMATEL and AHP methods in a neutral environment. Although their framework provides a safe environment for the supply chain management process, it lacks the data generated during the experiment [3]. Sarwesh et al. believe that the Internet of Things is managed by battery-powered devices and low-power wireless links because they refer to low-power networks. In today’s communications era, a lot of research work is focused on low-power wireless networks. They introduced a threshold called ETRT, which is calculated with the help of routing information. Subsequently, the MAC-based power control technology uses ETRT to allocate the best transmission distance for each node. The idea of this cross-layer model is to estimate the node according to the capability (ETRT value) of the node and allocate appropriate transmission power for each node. Therefore, allocating the best transmission power based on ETRT information can prolong the life of the network and improve the reliability and quality of service (QoS) of the network. Although their research can improve the reliability of the network, it lacks innovation [4].

An effective financial early warning system can predict the signs of a financial crisis and discover the reasons leading to the deterioration of the company’s financial situation in time, so that operators can quickly take preventive and control measures before the crisis arrives and eliminate the crisis in the bud, fundamentally stopping the crisis from happening. From the perspective of internal management control, research is carried out based on the issue of the impact of internal management control on financial risks, enumerating specific factors that may bring financial risks.

2. Financial Management Early Warning

2.1. Internet of Things. The Internet of Things is based on the accurate mutual communication protocol. It has the ability to match and set according to its own needs. It belongs to the global Internet direction. Objects in both the fictional world and the real world have physical characteristics and name codes, which can be tightly integrated with computers with the help of intelligent network ports. This process mainly includes the front desk to obtain the required content; the background uses the Internet, satellite signals, and other technologies to provide technical support for the front desk, so as to achieve the purpose of mutual communication between objects. As a new high-tech connection technology, the Internet of Things is based on the ability to sense the basic data [5, 6].

In the bottom layer of the Internet of Things, there are different types and a large number of data groups, which requires a variety of types of sensors to process these data. The types of sensors determine the types, contents, and formats of the data they process. Moreover, the sensor’s data processing is very accurate and in real time. Of course, due to the variability of the underlying data, only the sensor can quickly update the data and capture the data in time. Therefore, sensors enable people to obtain the data they need in time, and data is the premise of information processing. At the same time, data also plays a strong backing role for people in decision-making [7, 8].

In the actual application process, the value of the components in the middle part of the Internet of Things includes two aspects: first, regulate the RFID read-write components, ensure that the RFID read-write components can maintain the set mode to work, ensure that all kinds of read-write facilities can cooperate with each other, filter data, and filter most unnecessary data according to the set rules; second, due to the rapid development of Internet of Things technology, the development of Internet of Things technology is the inevitable trend of technology diversification and innovation. In the case of communication
protocol, standards are not unified, although the Internet of Things middleware can solve the communication barriers of all kinds of products [9].

In the architecture level of the Internet of Things, the type and quantity of information transmitted from the perception layer to the application layer are increasing step by step, and the amount of data to be processed and analyzed is multiplied. How to effectively mine, organize, and apply such a large amount of information is a difficult problem to be solved in the Internet of Things? Data analysis and processing function is a key to the effective application of the Internet of Things, and the emergence of cloud computing has realized this possibility. Cloud computing is a kind of distributed computing technology, which can process tens of millions or even billions of pieces of information in a few seconds, which provides a shortcut to deal with the massive information collected in the Internet of Things system. Cloud computing emphasizes the aggregation, optimization, and dynamic processing of information, which greatly improves the operation efficiency while reducing the cost of information processing [10].

2.2. Improved Nearest Neighbor Propagation Algorithm.
Suppose that \( x_i \) and \( x_j \) are \( m \)-dimensional sample points, and the distance between them is recorded as \( d(x_i, x_j) \); then we have the following.

2.2.1. Euclidean Distance.
\[
d(x_i, x_j) = \sqrt{\sum_{k=1}^{m} (x_{ik} - x_{jk})^2}
\]
(1)

2.2.2. Mahalanobis Distance.
\[
d(x_i, x_j) = \sqrt{\sum_{k=1}^{m} (x_{ik} - x_{jk})^T (x_{ik} - x_{jk})}
\]
(2)

Among them,
\[
\sigma_k = (\sigma_{k})_{m \times m},
\]
\[
\bar{x}_k = \frac{1}{n} \sum_{i=1}^{n} x_{ik},
\]
\[
\bar{x}_t = \frac{1}{n} \sum_{i=1}^{n} x_{it}.
\]

The calculation formula for the Silhouette indicator of sample \( t \) is as follows:
\[
\text{Sil}(t) = \frac{[b(t) - a(t)]}{\max[a(t), b(t)]}
\]
(4)

Here, \( a(t) \) is the average dissimilarity or distance between the sample point \( t \) in cluster \( C \) and all other samples in the cluster [11, 12].

Taking into account the shortcomings of the traditional nearest neighbor propagation algorithm in the calculation of data similarity, this paper combines the density peak algorithm to introduce local density into the original nearest neighbor propagation algorithm and then constructs the density attribute [13]. The local density \( \rho \) is an important variable in the density peak algorithm, and the local density of data points can be defined as
\[
\rho_i = \sum_j \chi \times (d_{ij} - d_i).
\]
(5)

Here, \( d_{ij} \) represents the distance between any two sample points \( i \) and sample point \( j \) in the data space, and the formula is as follows [14]:
\[
d_{ij} = \text{distance}(x_i, x_j).
\]
(6)

This paper comprehensively considers the distance attributes between data points and the relationship between the density attributes of any data point, calculates the density attributes and distance attributes through a weighted method, derives a new similarity calculation method, and then updates the similarity matrix. The new similarity calculation formula is as follows [15]:
\[
S = \frac{\text{Sum}(D(i, j) \times \rho(i)) \times \rho(j))}{\text{Sum}(D(i, j) < d_{ij})}.
\]
(7)

Here, \( D(i, j) \) is the Euclidean distance between data point \( i \) and data point \( j \) and \( \rho(i) \) and \( \rho(j) \) represent the local densities of data point \( i \) and data point \( j \), respectively [16].

In the original algorithm, the final clustering center of data points is determined through the transmission and communication of information, that is, the degree of belonging and attractiveness. However, in the original algorithm, for any data point in the data space, it is actually necessary to consider the influence of the neighboring data point on that point. That is, the similarity of the data is not only measured by the simple Euclidean distance between two points [17].

The calculation formula for the degree of attribution is as follows:
\[
a(i, k) = \min \left\{ 0, r(k, k) + \sum_{i' \neq k \neq i} \max\{0, r(i', k)\} \right\},
\]
\[
a(k, k) = \sum_{i' \neq k} \max\{0, r(i', k)\}.
\]
(8)

Here, the value of \( a(i, k) \) is the degree of support of \( k \) points for its own class representative plus the degree of
positive support of other sample points for \( k \) as its class representative [18].

2.3. Financial Management Early Warning. At present, among the more common enterprise diagnosis systems, comprehensive diagnosis and single diagnosis are more common. The former requires an overall analysis of the development of the company for a period of time and sorts out all financial activities. Risk early warning management provides guarantee [19]. Also, it promotes the overall upgrade of enterprise management level and control effects and earnestly maintains management standards and effectiveness. The latter is mainly for the analysis of individual financial activities of the enterprise, which can coordinate and review the financial strategy mechanism, financing strategy, and cost control structure [20].

The financial risk early warning system allows companies to have a complete financial risk prevention system. It shows its powerful early warning function from four aspects: the collection of financial risk information, the perception of financial risk, the avoidance of financial risk, and the provision of countermeasures to financial risk [21]:

1. **Collection of Financial Risk Information.** The establishment of a financial risk early warning system can better collect corporate financial information and nonfinancial information, which is the basis for companies to analyze financial risks. Real and effective financial data, business development reports, market changes analysis, industrial chain status, and other nonfinancial data can be integrated and analyzed through the financial early warning system to lay a solid foundation for the company’s follow-up work [22].

2. **Perception of Financial Risk.** Establishing a complete financial risk early warning system can perceive the financial risks faced by the enterprise in advance and discover problems in time. When the score of the financial system of the enterprise is abnormal, this change can arouse the attention of the managers, so as to leave enough buffer time for the enterprise to deal with the problem [23, 24].

3. **Avoidance of Financial Risks.** When the signal of a financial crisis appears, the company finds the root cause of the company’s crisis according to the early warning system and finds the problem with higher efficiency, which can not only save the cost of the company but also prevent the occurrence of financial risks and reduce unnecessary losses for the company [25].

4. **Provision of Countermeasures.** According to the above analysis, enterprises can use the financial early warning system to find out the root causes of financial risks as soon as possible and then provide corresponding countermeasures to support effective decisions made by the management and provide greater guarantee for the good development of the enterprise [26].

3. Early Warning Model System Experiment

3.1. Selection of Samples. This paper selects the mixed unbalanced panel data of 40 companies from 2006 to 2008 as the overall research sample. After eliminating the outliers and the samples of companies without data for two consecutive years, 390 pieces of data of 30 companies are selected as the modeling samples. In terms of data sets, this paper uses a variety of data sets to verify the CAP algorithm in many aspects. The number of attributes counted is the number of unlabeled attributes. The experimental data set is shown in Table 1.

3.2. Principles for Selecting the Early Warning Indicator System. The first step in constructing a financial risk early warning indicator system is to reasonably select indicators for early warning reference. Therefore, the selection of correct and effective financial risk early warning reference indicators is a basic and important preparation for the entire risk early warning indicator system. The selection of risk warning indicators should follow the following six principles: comprehensiveness, importance, scientificity, objective quantification, comparability, and operability.

3.3. Determination of Indicator Weight. Only by fundamentally improving the overall applicability value and objective index value of the early warning system can it facilitate the consolidation and use of data analysis. Combining relevant formulas, technicians should follow effective steps to centrally process and comprehensively control data and carry out empowerment management. The results of data analysis are often affected by the different values and units of each evaluation index. In order to eliminate this effect, this article uses SPSS software to reorganize the above-mentioned original financial data, so that the various variables are no longer comprehensive.

3.4. Construction of the Early Warning Indicator System. According to the principle of index selection, this article selects the financial index system in the model from five aspects of corporate profit, operation, debt repayment, development, and cash flow. This article adopts the Delphi expert analysis method, invites experts who have a certain degree of research in this area, and, through the respective methods of proposing corresponding independent evaluation index schemes, on the premise of taking the summary results as a reference, deletes underrepresentation and deviations from actual requirements. Then, according to the previously introduced evaluation principles and established methods, the collected indicators are classified and collected, so as to finally determine the indicator system of the risk assessment program.

3.5. Feasibility Test of Factor Analysis. This paper conducts a correlation test on 37 financial indicators and finds that there is a strong correlation between the indicators in each year. Based on this, the article uses factor analysis to reduce
4. Results and Discussion

4.1. Financial Status Analysis. This paper selects some indicator data such as solvency, operating ability, profitability, and growth ability and analyzes them with Pearson correlation coefficient. The results are shown in Table 2. In general, the Pearson correlation coefficient less than 0.3 indicates low-degree correlation, between 0.3 and 0.7 indicates medium correlation, and greater than 0.7 indicates high correlation. From the data in the table, it can be seen that solvency and operating capacity are highly positively correlated with the company’s situation; profitability, growth capacity, and nonfinancial indicators are moderately correlated with the company’s situation; financial leverage indicators have a low correlation with the company’s situation. However, no matter the degree of correlation is high or low, the data indicators have correlation and collinearity with the company’s situation. In order to reduce the collinearity and establish the model, this paper uses the factor molecular method.

The component score coefficients are shown in Figure 1. The difference between the eleventh eigenvalue and the twelfth eigenvalue is the largest. After the twelfth eigenvalue, the change of the eigenvalue tends to be gentle. So keep the first ten or two common factors. According to the preliminary cause analysis, it is found that the proportion of the enterprise’s own capital in the total assets is small, the long-term development stability of the enterprise is worrying, and the long-term solvency is poor. The rise of asset liability ratio at the same time can better explain the high debt level and financial risk. While expanding the business scale, the cash outflow is larger than the cash inflow, and the net cash flow is often negative, which increases the risk of not paying the principal and interest of the debt on time. After financing, the food and beverage manufacturing industry may increase the pressure of debt, increase the pressure of interest repayment in the later period, and reduce the income after excluding expenses, which will make the enterprise have no funds to repay. If the debt structure is unreasonable, the enterprise will fall into financial difficulties.

This paper selects four different evaluation indicators to compare and analyze the clustering performance of the algorithm. The specific analysis results are shown in Figure 2. According to the comparison chart of the clustering results and the comparison chart of the evaluation index results, it can be concluded that the DPWS-SAAP algorithm, K-means, and the original AP algorithm are simulated and verified on the same data set, and the DPWS-SAAP algorithm is for the four evaluations. On the other hand, in the clustering of the algorithm, the result figure, the improved DPWS-SAAP algorithm proposed in this paper can get the accurate number of clusters, indicating that the improved fusion method proposed in this paper can greatly improve the clustering performance of the algorithm to get the best clustering effect.

In order to verify the applicability of the improved algorithm proposed in this paper in the economic field, based on the above clustering results, this paper makes a further comparative analysis of the six selected economic indicators, compares the specific situation of each economic indicator under the two categories, and then completes the analysis process of China’s provincial economic situation, as shown in Figure 3. The provinces in the first category have obvious advantages over the provinces in the second category in the five economic indicators of GDP, the added value of the first industry, the added value of the second industry, the added value of the third industry, and the total amount of social fixed assets investment, which reflect the hard power of regional economy. At the same time, the CPI index is also in line with the current situation of regional economic development. Based on the analysis of DPWS-SAAP algorithm, the economic development of China’s provinces is basically in line with the characteristics of China’s regional economic development: the eastern coastal cities are relatively developed, while the western cities are relatively underdeveloped.

4.2. Algorithm Performance Analysis. The results of debt repayment risk indicators are shown in Table 3. From the data in the table, we can see that the current ratio and quick ratio indicators fluctuate greatly each year, and they show a clear trend of high-low-high changes. Although there has been a significant decline in 2019, it is still at a dangerous level compared with outstanding companies in the same industry. A higher debt-to-asset ratio will also generate more financial expenses, which will limit the company’s expansion to a certain extent.

The analysis of financial indicators of profitability is shown in Figure 4. Operating profit margin is one of the important indicators for judging the profitability of a company. The operating profit margin of China National Nuclear Corporation has fluctuated between 2.5% and 3.1% in the past three years. The operating profit margin in 2016 was lower than the industry’s average of 44.2%. This shows

| Data name     | Number of samples | Number of nonlabel attributes | Number of clusters |
|---------------|-------------------|-------------------------------|-------------------|
| Wine          | 178               | 13                            | 3                 |
| Ionosphere    | 351               | 34                            | 2                 |
| Contraceptive | 1473              | 9                             | 3                 |
| Page-blocks   | 5473              | 10                            | 5                 |
| Waveform      | 5000              | 31                            | 3                 |
that China Nuclear Construction Corporation’s operating profit margin is at a relatively low level in the same industry. Operating profit is very important. Its quality also affects other key financial indicators of the company, such as operating profit rate and net profit, as well as return on total assets and return on net assets. Through the analysis and research of the above situation, it is found that the company’s costs and expenses management and control have an

Table 2: Correlation coefficient results of different indicators.

|                      | Solvency | Operating capacity | Profitability | Growth ability | Financial leverage | Nonfinancial indicators |
|----------------------|----------|--------------------|---------------|----------------|--------------------|------------------------|
| ST company           | 0.82934  | 0.70318            | 0.67634       | 0.42125        | 0.24531            | 0.59219                |
| Non-ST company       | 0.73241  | 0.93273            | 0.51341       | 0.54214        | 0.32149            | 0.63124                |

Figure 1: Component score coefficient.

Figure 2: Clustering performance analysis results.
important relationship with the company’s profitability. Whether the management and control is in place directly affects the profitability. In addition, the company still lacks a corresponding regulatory review system, which is also a problem of inadequate cost management.

The weights and thresholds are obtained by random generation, and the neural network is trained with sample data. After training 200 times, the calculation results of the improved nearest neighbor propagation algorithm are shown in Figure 5. According to the calculation results of the figure, it can be seen that the improved nearest neighbor propagation algorithm can approach the expert’s scores on the financial status of each enterprise with higher accuracy after completing the training and has a higher prediction accuracy. Due to the error in the calculation process, it will cause the error of the evaluation. Generally speaking, it can be consistent with the expected prediction effect and meet the requirements of the model.

The test results are shown in Table 4. According to the analysis of the statistical table, the final corrective rate of the financial risk early warning model can reach 91%, and the total number of judgments is 200, where 182 judgments are correct, and only 18 are wrong judgments. At the same time, there are generally 1 wrong judgment, 3 wrong judgments under light alarm conditions, and 2 wrong judgments under heavy alarm conditions. Since most of the listed companies in the automobile manufacturing industry are in good financial health and are less dangerous, the overall early warning effect of the model is better.

4.3. Causes of Financial Risks. The comprehensive score of financial early warning is shown in Figure 6. In 2014 and 2015, the company’s comprehensive index scores could reach 0.7260 and 0.7993, and it was in the state of light alarm in the financial early warning system. When the financial score of the enterprise is at this stage, managers should pay attention to this. The company’s overall operation is in good condition, but individual indicators are worthy of attention. We should find out which indicators have problems as soon as possible and then take overall measures to deal with the situation. The company should analyze which of the four capabilities have not reached the expected industry standard value and then implement countermeasures to avoid the

| Years | Current ratio (%) | Quick ratio (%) | Assets and liabilities (%) |
|-------|-------------------|----------------|---------------------------|
| 2015  | 87                | 47             | 50.17                     |
| 2016  | 72                | 21             | 56.22                     |
| 2017  | 105               | 55             | 47.03                     |
| 2018  | 72                | 29             | 54.07                     |
| 2019  | 108               | 68             | 40.04                     |
| Merit | 163               | 81             | 34.27                     |

Table 3: Results of debt service risk indicators from 2015 to 2019.
company from falling into a financial crisis. In 2016–2017, the comprehensive scores were 0.5974 and 0.5661. The financial risk of the enterprise has entered the state of alert, and the enterprise faces relatively small financial risks. The company’s business operations are poor, some financial indicators are abnormal, and there are certain problems in the financial situation; and the possibility of financial risks is relatively high. In 2018, the comprehensive score was only 0.3504, which is a serious warning in the financial early warning system, and companies will be at greater risk of gluten. The company is experiencing difficulties in operation, most of the financial indicators are obviously abnormal, the financial situation tends to deteriorate, and the possibility of financial risks is very high.

The comparison of the algorithm error distribution is shown in Figure 7. The X-axis represents the unit of positioning error in meters, and the Y-axis represents the cumulative probability distribution of positioning error. It can be seen that the convergence speed of the algorithm proposed in this article has been significantly improved, and 80% of the positioning error is within 1 meter, while the traditional KNN algorithm-based positioning error is 80% within 2 meters, and the WKNN algorithm-based positioning error is 80%. Within 1.7 meters, 80% of the positioning error based on Bayes algorithm is within 1.5 meters. The subregion division method proposed in this paper based on the rate of change of the RSS signal effectively reduces the search space of the online positioning algorithm by dividing...
the indoor area into different subregions and reduces the computational complexity to a certain extent.

The company’s main business income in the past five years is shown in Table 5. As can be seen from the table, it can be seen from the financial statements of LBG Wine Company that, compared with 2014 and 2015, the growth rate of the company’s main business income has slowed down in the two years from 2016 to 2017. The rate has also dropped from more than 10% to less than 5%. It can be seen from the above that if the main business revenue growth rate is less than 5%, it means that the company’s products are in urgent need of replacement. This also reminds company operators that they should pay more attention to the management and financial risks of mergers and acquisitions. Guard against business losses.

The comparison of early warning results during T-2 period is shown in Table 6. The first and second error rates of the CAP algorithm model are lower than those of the BP neural network model, and the CAP algorithm model is more stable than the BP neural network model. Through the production quality cost management of automobile enterprises in the Internet of Things environment, the correlation between the calculation results of production quality cost and actual quality activities is improved, the effect of production quality cost optimization is dynamically tracked, and the guidance for on-site production quality cost optimization is strengthened.

The test results of the test sample group are shown in Table 7. Even if the financial data of t-3 years is used to warn the possibility of the company’s financial crisis, more satisfactory results can be obtained, and it also proves the outstanding role of the logistic regression method using the principal component analysis method in solving such problems. According to the relevant statistical data, it can be seen that, in this type of enterprise, the level of informatization investment is generally about 5%–8% of the net profit. If it exceeds this level, it means that the allocation of excessive resources will lead to suboptimal allocation of resources in terms of information development. If the investment in informatization is too low, it means that the enterprise’s neglect of informatization management and informatization management methods will also affect the
development history of its financial informatization. Therefore, the variable is an interval variable. It is more reasonable within this range.

5. Conclusions

In the process of development, enterprises are facing increasing market competition pressure. In order to effectively improve the development power and market competitiveness of enterprises and take the initiative in the fierce market competition, it is necessary to combine the market information and its own development status, actively build a systematic risk control mechanism on the basis of changing the traditional financial management structure, and integrate the antirisk ability, as well as operation and management innovation mechanism to maintain the effectiveness of risk early warning management level. This paper briefly introduces the concept of clustering analysis and the idea of main clustering algorithms and focuses on the AP algorithm and cure algorithm. Experiments are carried out on a variety of UCI data sets to verify the algorithm from its stability, the number of clusters, parameter stability, and other aspects. After understanding the mechanism of internal management control factors on financial risk, this paper constructs a detailed financial risk early warning system model from the perspective of internal management control. The feasible system model is further determined through the further screening of the indicators by the expert scoring.

Data Availability

No data were used to support this study.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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Table 5: The company’s main business income in the past five years.

| Indicator name                      | 2018             | 2017             | 2016             | 2015             | 2014             |
|-------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Main business income (ten thousand yuan) | 358,302.02 | 253,496.51 | 243,833.25 | 233,580.53 | 210,915.66 |
| Growth rate (%)                     | 41.34           | 3.96            | 4.39            | 10.75           | 17.00           |
| Score for this indicator            | 1.00            | 0.61            | 0.61            | 0.73            | 0.77            |

Table 6: Comparison of warning results during T-2 period.

|                          | Type 1 error rate (%) | Type 2 error rate (%) | Overall error rate (%) |
|--------------------------|------------------------|------------------------|------------------------|
| CAP algorithm model      | 13.33                  | 20.00                  | 16.67                  |
| BP neural network model  | 19.05                  | 23.81                  | 21.43                  |

Table 7: Test results of the test sample group.

|                          | ST company | Non-ST company | Overall |
|--------------------------|------------|----------------|---------|
| Number of samples        | 23         | 23             | 46      |
| Correctly determine the number of samples | 19     | 18             | 37      |
| Accuracy                 | 82.6%      | 78.2%          | 80.43%  |
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