



Risk Assessment and Control of Enterprise Fund Management Based on Genetic Algorithm

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Abstract. Enterprise capital management is an important link in enterprise management, risk assessment and control is the key to ensure the safe operation of enterprise capital. In view of the problems existing in the previous application of enterprise capital management methods, a risk assessment and control method of enterprise capital management based on genetic algorithm is proposed in this paper. The method can carry out a comprehensive and systematic assessment of enterprise capital management risks, and give the corresponding control measures according to the assessment results. The experimental results show that the use of genetic algorithm for enterprise capital management has a great improvement compared with the previous methods. The accuracy rate increased by 12.6 percent from the average 67.6 percent, and the running speed decreased by 8.12 hours from the average 15.82 hours. Therefore, genetic algorithm can effectively improve the risk assessment and control ability of enterprise capital management.

Keywords: Fund Management, Genetic Algorithm, Enterprise Funds, Risk Assessment and Control

1 Introduction

In this era of constantly rising economic levels, companies also have increasingly high requirements for their own fund management. If the risk of funds is too high, it is very likely to lead to serious consequences such as bankruptcy, which is by no means what a top management of a company is willing to see. However, the prediction accuracy of existing risk assessment and control methods is often not very high, so it is necessary to upgrade the assessment and control methods. The risk assessment and control of enterprise fund management based on genetic algorithms can effectively improve the accuracy of the assessment and control.

Improving the fund management capabilities of enterprises is very important, so many researchers have also conducted research on it. Ouma Stefan explored issues such as fund management and society from the perspective of agriculture, and ultimately concluded that this study can enable people to question and re politicize the often intangible financial ethics, which is as important as “value” [1]. Rice Charles studied the rapid construction practice established by Moxley in Chelsea Port and analyzed the

financial management risks involved, ultimately improving the speed of both design and construction [2]. Dalla Pellegrina Lucia used a randomized controlled trial to evaluate the results of integrating fund management and entrepreneurship training into microcredit projects in India. He found that this had a positive and significant impact on customers' financial management skills and entrepreneurial abilities [3]. Li Xuetao proposed an optimized BP neural system as a financial early warning model and ensured its high prediction accuracy. In the research, the working principle and related reasoning process of the model were elaborated, its shortcomings were analyzed, and a solution was proposed [4]. Hamid, Fazelina Sahul studied the relationship between socio-economic factors, financial literacy, fund management skills, overspending, and impulsive credit card repayment decisions. The fund management skills related to financial statement monitoring, timely payment of bills, budget expenditures, and handling fund matters have had a good impact on credit card repayment [5]. Although these studies have contributed to the study of fund management to some extent, they have not been of much help in enhancing the ability of enterprises to resist risks.

Improving the risk resistance ability of enterprises is crucial, especially in terms of fund management risk, which directly affects the survival of enterprises. Therefore, this article used genetic algorithms to study the risk assessment and control of enterprise fund management.

2 Enterprise Fund Management Risks

The survival of a company depends on the ability of its management personnel to manage funds. The better the management of funds, the more sustainable the company can operate. However, if the management effect is too poor, it directly affects the survival of the company. First, it is necessary to define the limits on the usage of fixed, operating, and specialized funds, which are not mutually exclusive. Carrying out the project management, the utilization of all kinds of resources must satisfy the needs of the country's planning mission, and the efficient utilization of resources in accordance with the commercial decision-making of the company, the combination of centralized administration and distributed and layered administration. A accountability system is set up for the utilization of funds so as to facilitate the rational and economic utilization of the funds among all entities in the company. Combining specialized management with mass administration, the finance and accountancy sections cooperate with related departments which apply the money together and maximize the utilization of resources [6].

It is inevitable that there are some risk in the business capital management, there are 8 kinds of risks in the operation of the company's capital, which are the market, the credit, the liquid, the operation, the law, the accountant, the information and the strategy.

(1) Market risk: The risk that an undertaking loses its business activity or its investment due to variations in the value of its shares, for example, by variations in interest rates, foreign currency, share prices and on its gains or losses etc. [7].

$$L = \frac{1}{T} \sum_t \log f(w_{t-n+1}, w_{t-n+1}, \dots, w_{t-1}; \theta) + R(\theta) \quad (1)$$

(2) Loan risk: the risk of a business partner not being able to make a payment for a product, or failing in bad faith, leading to no recovery [8].

(3) Liquidity risk: Risks that influence an organization's capital allocation capacity, for example, its responsibility, its liquidity, and its extraordinary liquidity [9].

(4) Occupational hazard: A hazard arising from a faulty operating system or an operating neglect of an undertaking, for example a flawed or inconsistent procedure, a negligent performance of a task or a lack of internal controls [10].

(5) The legal risk: The integrity of the contract, the validity of the agreement, and the possible risks for the company, for example, the lawfulness of the transactions carried out, the acceptance of a foreign-language agreement, and the legislation of other countries.

(6) Accounting risk: The accounting treatment and taxation that might bring about a firm's gain or loss, for example, the adequacy and lawfulness of the accounting treatment, and the integrity of the tax advice and handling.

(7) Information Hazard: Improper management, functioning and back-up of IT systems may result in threats to businesses, e.g. system disruptions, failures, de-blocking of data, safety and the avoidance and treatment of computer viruses.

(8) Strategic risk: the danger that firms can make inappropriate choices on the market or key products in the context of competition.

$$p(w_{t-n+1}, w_{t-n+2}, \dots, w_{t-1}) = \frac{e^{y w_t}}{\sum_i e^{y}} \quad (2)$$

A corporation's operating funds are a way to live, any business operation needs to be backed by working funds, when a firm's operating funds are not sufficient to cover their day-to-day operating requirements, their operations could be seriously compromised, or even go bankrupt.

Most enterprises generate a certain amount of accounts receivable in their operations, and accounts receivable have a significant impact on the company's funds. If the amount of accounts receivable of a company is too large, it can bring significant financial pressure to the company's operations.

Many companies have good business operations themselves. However, due to the inability to collect accounts receivable generated by many businesses on time, the company's cash flow is tight. Once the pressure that the enterprise can bear exceeds, there is a possibility of a collapse of the enterprise.

Internal fund management is also very important in enterprise operations. If fund management is not scientific enough and there is a situation of fund confusion, it can bring financial risks to the enterprise. Enterprises not only need sufficient cash flow internally, but also scientific cash management to promote the normal operation of the enterprise through scientific management. Although some enterprises have abundant capital flow, their fund management is relatively chaotic, leading to problems with their funds.

The expansion of enterprises can also cause financial risks, especially in the case of rapid expansion, which can lead to a mismatch between business scale and capital scale,

thereby bringing financial risks to the enterprise. Many enterprises embark on a path of diversification in their development, hoping to improve their competitiveness and expand their business scale through diversification. Although diversified development can bring some new opportunities to enterprises, it is also easy to bring new risks, especially the increasing demand for funds during enterprise expansion. If a company's funds cannot keep up with the scale of business development, it would bring financial risks to the company.

3 Genetic Algorithm

The introduction of variants in genetic algorithms has two purposes. Firstly, genetic algorithms have the ability to perform random searches in regions. Due to the general use of crossover operators in genetic algorithms, the possibility of conducting local random searches on variational operators can accelerate convergence to the optimal solution. Obviously, in this case, the probability of change should be taken as a smaller value, and if it is the maximum value, the building blocks close to the optimal solution may be destroyed. Secondly, there is a genetic algorithm to maintain the diversity of the population and prevent chaotic convergence phenomena. At this point, the probability of convergence should be taken as a higher value.

Search engine optimization (SEO) is the process of optimizing a website to improve its ranking in search engines. Genetic algorithm is a kind of algorithm simulating biological evolution process, which can be applied to search engine optimization problem generation. The following is the process of improving problem generation using genetic algorithm: Define the objective function generated by the problem. In search engine optimization, the objective function is usually to maximize the score of the keyword ranking. The objective function generated by the problem needs to match the keywords to the site content and take into account the rules of the search engine algorithm.

In genetic algorithms, crossover operators are used as the main operator due to their universal search ability, while variational operators are used as auxiliary operators due to their local search function. Genetic algorithm has a balanced search ability, allowing it to perform both general and local searches simultaneously through crossover and mutation operations. The so-called win-win cooperation means that if a population is trapped in a hyperplane of the search space during the evolution process and cannot be eliminated through separate intersection, mutation can help it eliminate. The so-called mutual competition refers to the mutation operation that may destroy the required building blocks if they are formed through crossing. The effective utilization of the combination of crossover and mutation operations is the top priority of genetic algorithms.

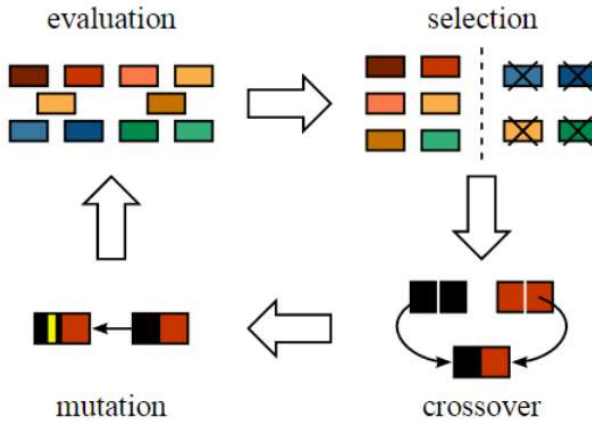


Fig. 1. Process of Genetic Algorithm

Base mutation algorithms are basic modifications to binary sequences (0,1) by randomly selecting one or more loci from a set of DNA sequences and changing their genetic values:

A mutation that marks gene * below the site.

The selection of mutation rate is often influenced by population size and chromosome length. The selection of a small value is usually between 0.001 and 0.1.

The algorithm ends when the optimal fitness reaches a certain threshold, the optimal fitness and population fitness no longer increase or the iterative times reach a predetermined threshold. Standard algebra is usually defined from 100 to 500 .

Due to the fact that the global search strategy and optimization search method of genetic algorithm do not rely on gradient information or other auxiliary knowledge in calculation, but only require an objective function and corresponding ability function that affect the search direction, genetic algorithm provides a common foundation for solving complex system problems. Here are some of the main applications of genetic algorithms.

(1) Functional optimization: The application fields of classical genetic algorithms and the evaluation of the effectiveness of genetic algorithms. Many researchers have established a variety of complex test functions, such as continuous and discrete, convex and concave, low-dimensional and multi-dimensional, single-mode and multi-mode. There are many nonlinear, multitasking and objective function optimization problems that cannot be solved by other optimization methods. However, genetic algorithm can easily get a good result.

(2) Combinatorial optimization: As the number of questions increases, so does the search space for Combinatorial optimization. In the current calculation, it is difficult to get the optimal solution by enumerating, so it is very important to find the satisfactory solution to this kind of complex problem. Practice has proved that genetic algorithm is an efficient function optimization method, so far, genetic algorithm has been applied to

travelers, backpacks, packaging and graphics decomposition. In addition, it has been applied to manufacturing programming, automation, robotics, image processing, artificial intelligence, genetic coding and machine learning .

(3) Workshop design: This is a classic question. As one of the classical intelligent algorithms, genetic algorithm has been widely used in plant design. A lot of researches have been done on the application of genetic algorithm in workshop design, and some achievements have been made. In many cases, genetic algorithm has been proved to be better than optimal or approximate optimal algorithm .

Genetic operation is the practice of simulating biological genetics. Genetic algorithm constructs the original population by coding, and then performs certain operations on the population according to its own ecological capacity (fitness evaluation) to realize the evolutionary process of the optimal population. In the aspect of search engine optimization, Genetic algorithm can be used to improve the solving process of the problem generation, so as to be closer to the optimal solution. This is a flow chart of the GA, as shown in Figure 1.

Individual fitness function is the basis for genetic algorithm to search. In multi-objective genetic algorithm, the value of individual fitness function is proportional to the genetic probability, and its value can be used to measure the genetic probability of individuals in the next generation population. Since individual fitness values range from 0-1 and are all positive numbers, the formulas of genetic algorithm operation is shown in (1) - (3).

$$\Delta\gamma = xyz^2 + yab - \frac{xb^2}{y} \quad (3)$$

In Formula (1), $\Delta\gamma$ represents the moderate value, x represents the highest objective function value, y represents the individual fitness value, and z represents the population fitness value.

The higher the individual's fitness function is, the better it is. According to the value of each individual's fitness function, the optimal combination parameters can be obtained to achieve the evaluation and control of enterprise fund management risk. The calculation method is shown in Formula (2).

$$Q = xyz^3 + az^2b \quad (4)$$

In Formula (2), a represents the probability of risk and b represents the amount of risk. The proportion of each individual is calculated, which is the individual's selection probability $\Delta\delta$, using the following formula:

$$\Delta\delta = \frac{\Delta\gamma}{yP_\gamma} \left(\frac{1-A}{A} - \frac{\delta}{y} \times \frac{y \times y_i}{y\delta} \right) \quad (5)$$

In Formula (3), A represents the ratio of risk amount to risk probability, and P_γ represents the possibility of solving the risk.

4 Application Experiment of Genetic Algorithm in Fund Management.

In order to verify the effectiveness of genetic algorithm in improving fund management level and reducing management risks, the experimental team visited a Fortune 500 company and evaluated its fund management department, obtaining the results shown in Table 1.

Table 1. Fund Management Evaluation Form

Evaluation object	Score	Evaluation object	Score
Investment decision-making	70	Use situation	71
Investment planning	68	Purpose of use	65
Use responsibility system	72	Effect of use	75
Management responsibility system	75	Manage risk	60

From the data in the table, it can be seen that the company has made considerable progress in establishing a management responsibility system and achieving effective fund utilization. However, for other aspects, it is slightly insufficient, especially in terms of fund management risk, which has just passed the exam and requires timely and effective measures to improve.

The experimental team used genetic algorithms to upgrade the company’s fund management risk assessment and control capabilities, and then compared them with their previous assessment and control data. The final results are shown in Figures 2 to 3.

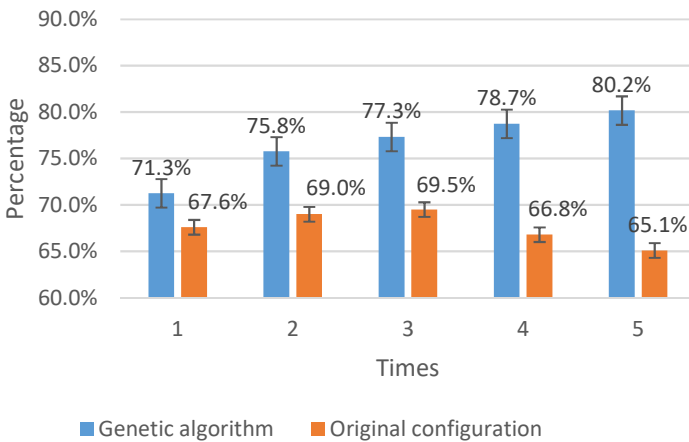


Fig. 2. Accuracy of Risk Assessment and Control

In Figure 2, it can be seen that during the second experiment, the accuracy improvement was the highest, from 71.3% in the first experiment to 75.8%. In the fifth experiment, the accuracy reached 80.2%, with an average accuracy of 76.65%. However, in the previous evaluation data, the highest value could only reach 69.5%, with an average accuracy of 67.6%.

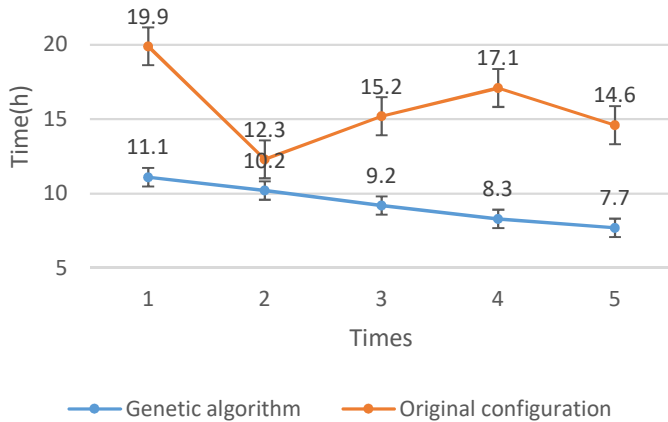


Fig. 3. Risk Assessment and Control Time

In Figure 3, it can be seen that after upgrading the risk assessment and control of fund management using genetic algorithms, the possible time spent on each assessment and control continues to decrease, with the fifth assessment only taking 7.7 hours, and the average assessment and control time being 9.3 hours. In the previous evaluation and control data, the fastest time was 12.3 hours, a little over half a day, with an average evaluation and control time of 15.82 hours.

Based on the above two results, it can be concluded that genetic algorithm based enterprise fund management is very effective in improving the accuracy of risk assessment and reducing assessment time, and can be promoted in future enterprise fund management.

5 Conclusions

If enterprises want to survive for a long time, they must attach importance to fund management, especially risk assessment and control. Improving the level of fund management and risk assessment and control capabilities can enable the enterprise to have stable cash flow. This article used genetic algorithms to optimize and upgrade risk assessment and control in fund management, which has achieved significant results and may be widely applied in enterprise management in the future. Although the method used in this article can improve evaluation accuracy and reduce evaluation time, the number of experiments is only 5, which is slightly less. Therefore, in future research, it is necessary to consider conducting 8-10 experiments to improve the reliability of the results.

6 Comment

Enterprise funds are the basis of survival and development of enterprises, and the material basis of enterprises in the process of production and operation. The risk of enterprise fund management refers to the possibility of financial loss or financial loss and economic loss or negative influence due to the defect or improper decision in fund management. Therefore, the State stipulates in the Basic Standards for Internal Control of Enterprises that enterprises shall establish an internal control system, implement comprehensive risk management, improve upon risk prevention mechanism, strengthen internal supervision of the relevant control activities, promptly discover and correct errors and fraud, ensure legitimacy and compliance of business management, asset safety and value maintenance and appreciation.

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