Simulation Research on Intelligent Investment Agent Monitoring and Management System Optimization Based on Artificial Intelligence

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Objectives: How to construct an effective investment early warning model, scientifically and accurately predict China's extreme financial risks, and thus formulate effective measures to deal with and prevent risks, has become an important issue urgently needed to be solved by financial risk management departments and investors. Based on multi-step factor analysis and artificial intelligence classification, two main intelligent investment models based on artificial intelligence are designed in this paper. Firstly, the principal component analysis method and multi-step factor extraction method are used to select the variables of 28 Financial Indicators of listed companies, and a multi-factor analysis investment model is constructed. Secondly, a smart single classifier based on factor analysis is designed. The experimental results show that combined with multi-step factor analysis has a better warning effect. The final research results show that the algorithm can guarantee the convergence performance and dispersion performance for different optimization problems, and has the advantages of stability and robustness, which embodies the application value of the algorithm.

Key words: artificial intelligence; intelligent investment; factor analysis
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Whether it is for the financial risk management department or for investors, it pays particular attention to the extreme financial risks caused by the extreme decline of financial markets.[1] General financial risks, that is, non-extreme financial risks, usually do not cause huge losses to investors, nor do they pose a fatal threat to financial markets. Investors can tolerate such risks. Extreme financial risks are not tolerated by investors.[2] The rapid development of artificial intelligence and its harmonious performance with all walks of life have made people realize that artificial intelligence will be a profound driving force for changing social life and even changing the world, both now and in the future.[3] As a product of the integration of Finance and science and technology, intelligent investment has great potential for development. At present, domestic attention to intelligent investment has been increasing and many platforms have emerged. However, the overall development is still in the initial stage. There are many differences between data, algorithms, user concepts and regulatory issues abroad. Only by solving these problems can intelligent investment become a domestic financial market. The field brings more surprises.[4] It is usually defined as the integration of Finance and technology, that is, to apply science and technology to the financial field, and to promote the innovation of financial system through the change of technological tools. The extension of

financial science and technology covers payment and settlement, electronic money, network lending, big data, block chain, cloud computing, artificial intelligence, intelligent investment, intelligent contract and other fields.[5]

In China's capital market, the investment technology based on artificial intelligence, with its unique advantages, formally goes to the front stage. According to the relevant information published on the website of Guangzhou Development Fund, various industries are trying to use intelligent investment technology to improve investment efficiency and explore market value in a diversified way.[6] Although there are many research results on evolutionary algorithms at present, there are still some problems in common evolutionary algorithms that are difficult to overcome or imperfect. For example, the convergence speed is slow, the accuracy of the solution is not high, and it is easy to fall into local minimum.[7] This is because the evolutionary algorithm has a pair of contradictory basic capabilities, a global exploration capability and a local development capability. The existing evolutionary algorithms are mostly a compromise between these two capabilities, and different optimization problems often require that the evolutionary algorithms can be different. The timing makes a choice between these two capabilities. Compared with the long-term research and accumulation of developed countries in this field, China's artificial intelligence-based investment research has only been carried out for about 15 years, and further research is needed.[8] Due to the different business operations and methods of the company and the high complexity of financial indicators, further warnings will be more difficult. With the emergence of new technologies and new ideas such as statistics, artificial intelligence and data mining, the information acquisition and analysis and judgment before the financial crisis are gradually becoming possible.[9]

In this paper, a hybrid strategy-based collaborative evolution algorithm is designed for the characteristics of single-objective optimization problem and multi-objective optimization problem. The intelligent investment based on artificial intelligence is used to test the performance. Finally, the algorithm is applied to the portfolio investment problem.[10] The main work is divided into the following parts: design, implementation and performance testing of single-objective co-evolutionary algorithms. The multi-objective co-evolution algorithm is designed to solve the portfolio investment problem. The data of China stock market is taken as an example, and the effective frontier of the algorithm is given. At the same time, the multi-step factor analysis financial early warning method is used to construct a factor analysis model of listed companies.[11] Firstly, the factor analysis method is introduced, and the initial financial indicators of selected sample companies are extracted by multi-step factor extraction method. Then, the factor analysis model of financial early warning of listed companies is constructed, and the empirical analysis and result test are carried out.[12] Finally, the financial early warning model of listed companies is constructed by using intelligent investment based on artificial intelligence. On this basis, the method of non-equilibrium sample processing in computer science is combined with artificial intelligence technology to construct an improved intelligent investment model of artificial intelligence, and the prediction performance of the model is further verified by empirical research. Therefore, this paper has obvious innovation in research ideas and methods.[13]

The main content of this paper is to analyze and elaborate the relevant theoretical knowledge of intelligent investment in artificial intelligence. At the same time, combining theory with practice, it focuses on discussing and describing in detail the relevant technical problems and solutions encountered in the development and construction of China's intelligent investment platform from the perspective of artificial intelligence. The main contributions of this paper are as follows:

a. In this paper, a single-objective co-evolutionary algorithm is used in the analysis of AI investment.

b. This paper constructs an intelligent investment model of artificial intelligence, and further verifies the predictive performance of the model through empirical research.

c. In this paper, a hybrid strategy-based collaborative evolution algorithm is designed for the single-objective optimization problem and multi-objective optimization problem. The intelligent investment based on artificial intelligence is used to test the performance. Finally, the algorithm is applied to the portfolio investment problem.

d. Considering the nonlinear and complex characteristics of China's financial market, the artificial intelligence technology of computer science was introduced to conduct investment early warning research. Therefore, an artificial intelligence investment model suitable for the early warning of extreme risks in China's financial market is constructed.

METHODS

It is the fundamental purpose of risk management for financial risk management departments and investors to build an effective early warning system for financial market risk investment to cope with and prevent the occurrence and deterioration of financial crisis. Financial market investment risk warning has always been the focus and hot spot of academic circles, and fruitful research results have emerged. Li Y created the KLR signal model for financial risk warning, and empirically studied the currency crisis in some developed and developing countries, and confirmed that the KLR signal model has good predictive performance.[14] Wang X N proposed a simple Logit crisis early warning model based on lagging macroeconomic and financial data, and conducted empirical research on crisis samples from 28 developing countries.[15] For example, Boulay B D chose 20 financial ratios.[16] divided into four groups. David's choice covers 35 variables of seven major types. Co-evolutionary algorithm needs to interact with other individuals in the evolution process. Interactive partners can come from the same or other populations, and the fitness calculation also needs the participation of other individuals.[17] Li L proposed a ranking network based on competitive co-evolutionary algorithm, which became the pioneering work of co-evolutionary algorithm. So far, many scholars in the world have carried out relevant research on co-evolutionary algorithm and achieved gratifying results.[18]

SVM is a new artificial intelligence model developed in recent years. It has excellent generalization performance and is favored by many researchers. It is widely used in risk early warning research and has achieved good results. Qualitative selection of financial indicators and quantitative selection methods are combined. Leary D E tries to apply the financial crisis early warning indicators related to stock prices. On the basis of 125 alternative indicators, two indicators systems are constructed through single index prediction accuracy analysis, correlation matrix analysis and cross-validation analysis.[19] Zhang X directly adopts the packaging method to select features in the SVM financial crisis early warning modeling, and adopts the forward feature selection method. Each feature subset is evaluated by the performance of the corresponding SVM model.[20] The results show that the classification effect and generalization ability of SVM are better than BPNN and RBFNN; Li R combines principal component analysis method, genetic algorithm and SVM to construct PCA GA SVM early warning model, and the Shanghai and Shenzhen 236 index and large-cap stocks. The trend of prediction research has achieved good prediction results.[21]

What is the core of the investment? Nothing more than two points: good decision making and good execution. The advantage of artificial intelligence is that it makes better decisions and performs better. On the one hand, artificial intelligence has greatly expanded the boundaries of investment decisions and more intelligently captures the value of investment. From the perspective of large investment logic, investment decisions include two points, one is macro asset allocation. The second is the micro-composite construction. From the perspective of asset allocation, Baifa Value is a hybrid fund. Under the market economy conditions, due to the influence of the government's macro-control policies, the risk management of traditional financial institutions tends to be prudent and stable, the risk pricing is market-oriented, and credit funds are more biased towards operations. A robust large enterprise. Traditional finance is very cautious about the risk of equity pledge,

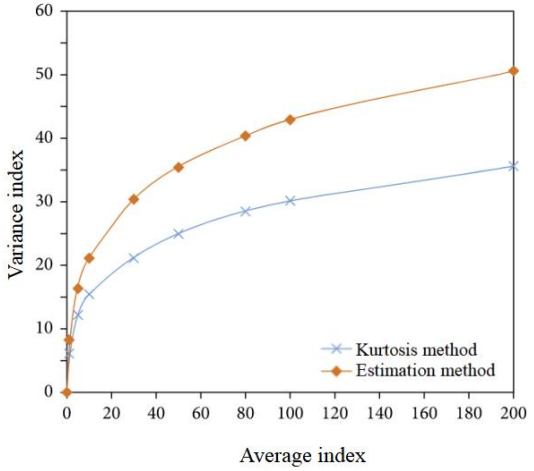
intellectual property pledge and order pledge of small and medium-sized technological enterprises. At this stage, the financial industry mainly builds an online business platform, using the Internet or mobile terminal channels to collect a large number of users and information, to achieve the interconnection of any combination of assets, transactions, payments and funds in the financial business, the most representative of which is the fund sales of the Internet, P2P network lending, Internet insurance. Secondly, the change of asset allocation structure promotes the development of intelligent investment. This aspect is most obvious in our financial market.

In this paper, the above mathematical statistics methods are used to select their respective thresholds, and the algorithm average is used as the final threshold. The calculation results of the threshold are shown in Table 1 and Figure 1.

Table 1
Threshold value

Mathematical statistics	Average value	Variance
Kurtosis method	0.36	0.84
Estimation method	0.17	0.76

Figure 1
variance

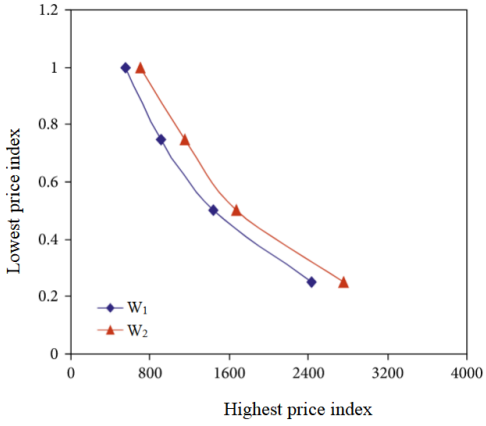


Taking the representative international financial market as the external risk crisis factor of China's financial market, the paper takes the daily return rate of stock index in two representative international financial markets as the external characteristic index (see Table 2 and Figure 2).

Table 2
Characteristic indicators of the extreme financial risk early warning model

Characteristic index variable	Highest price	Lowest price
W1	8.96	7.71
W2	7.36	8.14

Figure 2
characteristic indicators of the extreme financial risk early warning model



Support Vector Machines are machine learning methods for classification and nonlinear regression. The support vector machine is in separable mode, and in the case of relatively limited samples, the balance between the model's capacity and learning ability is sought, so that the actual risk is minimized, and the best generalization ability is obtained. In particular, artificial intelligence technology such as service robots should be regarded as a strategic technology for future development, focusing on a number of intelligent high-end equipment, and developing and cultivating a number of artificial intelligence core enterprises with an output value of more than 20 billion yuan. Policy and financial support, talent pool, technology accumulation and breakthroughs have all provided the basic conditions for the development of artificial intelligence. Artificial intelligence relies on the advantages of machine learning in self-adapting massive data processing and investment model, realizing scientific decision-making, improving the efficiency of asset allocation, and improving

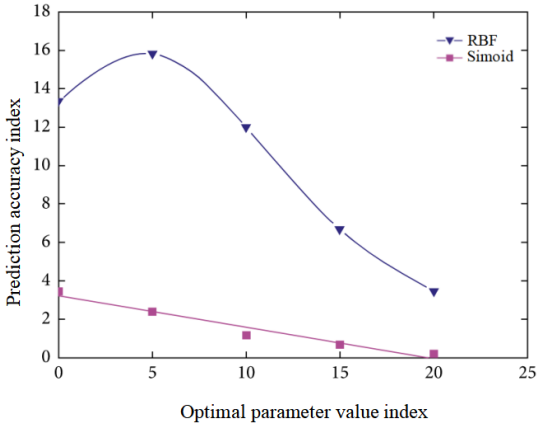
the efficiency of capital utilization and investment in an all-round way. From the perspective of micro-portfolio construction or stock selection, AI can not only effectively use large data and investment decision-making information far beyond any individual's processing ability, but also bring breakthrough innovation to the traditional quantitative stock selection model through high-frequency iterative training. Internet finance can break through the geographical constraints of traditional finance, integrate funds from various regions, achieve a wider range of capital flows, and broaden the financing channels of technology-based SMES.

From Table 3 and Figure 3, it can be seen that the prediction accuracy of SVM under each kernel function is over 90%. It shows that the prediction performance of SVM under each kernel function is excellent based on the evaluation criterion of prediction accuracy.

Table 3
Prediction results of SVM under various kernel functions

Kernel function	Optimal parameter value	Prediction accuracy(%)
RBF	8	95
Simoid	5	97

Figure 3
prediction results of SVM under various kernel functions

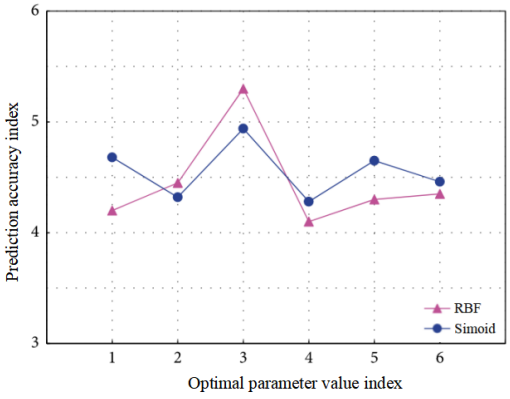


The empirical results are shown in Table 4 and Figure 4. It should be noted that some kind of kernel function that can make a model achieve the optimal prediction result does not help another model to achieve the optimal prediction result. Therefore, the kernel functions used in each model in Table 4 are different, but both It is a kernel function that makes the corresponding model achieve the optimal prediction effect.

Table 4
Prediction results of SVM under each unbalanced sample processing method

Kernel function	Optimal parameter value	Prediction accuracy(%)
RBF	10	89
Simoid	9	91

Figure 4
prediction results of SVM under each unbalanced sample processing method



The current very popular smart investment refers to the robot's algorithm of asset portfolio theory to build data models and back-end algorithms to provide investors with intelligent and automated asset allocation recommendations. The combination of artificial intelligence and finance has enabled smart investment to come out. As an emerging online investment advisor and wealth management service, Smart Investment uses technologies and portfolios such as big data, cloud computing, intelligent algorithms and machine learning based on factors such as customers' financial needs, asset status, risk tolerance and risk appetite. The theoretical model provides investors with the best investment portfolio while tracking market dynamics and adjusting investment allocations in a timely manner. Its search for global optimal solution is realized through cooperation and competition among individuals. It has the advantages of simplicity, less controlled parameters and fast

convergence speed. The main idea of particle swarm optimization (PSO) is to update the speed and position of the search space dynamically during the search process of the particles themselves and the whole swarm of particles, and gradually move closer to the particle with global optimum position, so as to achieve the goal of individual optimization in the whole space.

RESULTS

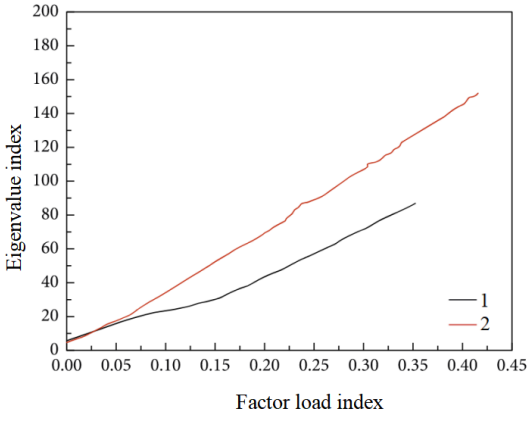
At present, the international giants have not completely formed a monopoly in AI technology. Compared with developed countries, China is not lagging behind in the research of AI. This is a rare historical opportunity for us and an excellent opportunity to enhance our comprehensive national strength and influence. On the other hand, it is reflected in discipline. Machine-assisted investment execution can ensure the efficiency of investment discipline execution. Machine execution is more efficient than manual execution in terms of time. In addition, in addition to time efficiency, the logic of intelligent investment will effectively restrict the arbitrariness in the process of human-centered investment. Many of the disciplines of investment are anti-human. Humanity's waywardness often leads to emotional decisions, and even good fund managers are not immune. Each data node can verify the contents of the book and record history, improve the system's accountability, reduce the system's trust risk, and have a flexible architecture. Blockchain technology can also reduce the operating costs of financial institutions and achieve the effect of sharing finance. Its specific application areas include peer-to-peer transactions, cross-border payment, settlement, and settlement of P2P. It can also be used to record various information such as customer identity data and transaction records. The traditional investment service can not meet the needs of customers. For most investors, how to allocate assets reasonably becomes a problem, which provides space for the development of smart investment.

In this result, we finally extracted two common factors, involving a total of 8 original financial indicators, and the cumulative variance contribution rate reached 93.67%. It is worth mentioning that these two common factors have a high variance contribution. The specific factor analysis results are shown in Table 5 and Figure 5.

Table 5
Factor analysis result

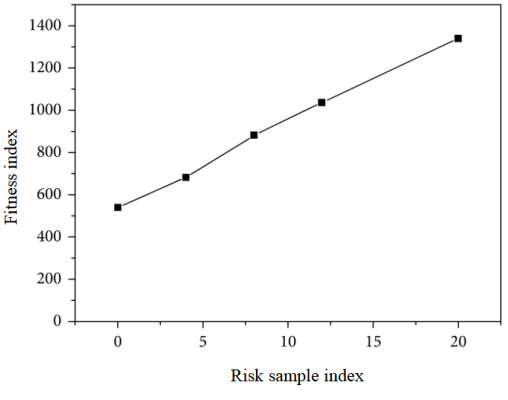
Factor	Factor load	Eigenvalues
1	0.86	6.39
2	0.96	7.12

Figure 5
Factor analysis result



In order to verify the accuracy of the calculated threshold value, this paper draws the fitting effect diagram of the tail GPD curve and the empirical distribution (see Figure 6). It can be seen intuitively from the graph that GPD and empirical distribution have better fitting effect, which shows that the calculated threshold value of extreme financial risk sample is scientific and reasonable.

Figure 6
standard income tail experience distribution and GPD distribution fitting effect diagram



In order to calculate the tail index estimates, this paper ascends the order of the yield series of all samples, and calculates as follows:

$$\omega_j = d_j / \sum_{j=1}^{p} d_j = \left(1-e_j\right) / \left(p - \sum_{j=1}^{p} e_j \right) \quad (1)$$

In order to calculate the estimated value of p, the yield series of all samples are descended and calculated as follows:

$$I_i = \left[\sum_{j=1}^{p} \omega_j^m y_{ij}^m \right]^{1/m} \quad (2)$$

For samples that exceed this threshold, they are defined as extreme financial risk samples, and the remaining samples are defined as non-extreme financial risk samples. First calculate the kurtosis Fc of the sample:

$$\mathrm{F}_c = \frac{2b}{\left(n+l\right)K^{\frac{1}{n}}} \left(\frac{W}{A} \right)^{\frac{n+1}{n}} \quad (3)$$

Among them, K represents the standard deviation of the return series, which is calculated as follows:

$$\mathrm{F}_r = \left(A_c + W tan\varphi\right) \left[1 - \frac{K}{iK} \left(1 - e^{\frac{iL}{k}} \right) \right] \quad (4)$$

It should be noted that for sufficiently high thresholds, the samples exceeding the thresholds almost obey the generalized Pareto distribution cluster, as follows:

$$S_j = \sum_{i=1}^{N} w_{ij} X_i \quad (5)$$

If the function directly models the rate of return sequence that does not satisfy the independent and identical distribution conditions, it will inevitably lead to the failure of the model. Therefore, the model models the yield series as follows:

$$\left.\right) x = T_h\left(A,t\right) = \begin{cases} A & |A| \geq t \\ 0 & |A| \mathrm{p}\ t \end{cases} \quad (6)$$

Through the above formulas, the standardized residual K can be estimated and the following formulas can be satisfied:

$$K_{s,d} = \frac{1}{MN} \sum_{m=1}^{M} \sum_{n=1}^{N} \frac{\left| \left| W_{s,d}(m,n) \right| - \mu_{s,d} \right|^4}{{\sigma_{s,d}}^4} \quad (7)$$

In formula (7), m denotes the standard K distribution with degree of freedom n. By integrating formula (7), the parameters m and N can be obtained and brought into the following functions:

$$D(\mathbf{V}_t, \mathbf{V}_t') = \sqrt{\sum_{i=1}^{c} \left(\frac{V_{ti} - V_{ti}'}{|V_{ti}| + |V_{ti}'|} \right)^2} \quad (8)$$

By estimating the parameters in the above function, the lower tail dependent coefficient P can be obtained:

$$P = \frac{\sigma_i^2}{\sum_{i=1}^{m} \sigma_i^2} \quad (9)$$

The P area is divided into m×n cells of the same size, and i represents the cell of the mth column of the hth row, so the statistic is constructed as follows:

$$P_h = \frac{\sum_{i=1}^{h} \sigma_i^2}{\sum_{i=1}^{m} \sigma_i^2} \quad (10)$$

H denotes the number of observation points in cell I. K denotes the frequency at which the predicted data calculated by the model falls into cell j, and can be calculated by the following formula:

$$U_{ij} = \frac{H_{ij}}{\sqrt{\sum_{t=1}^{k} H_{it}^2}}, i = 1,...,n,\ j = 1,...,k \quad (11)$$

Then the training set X is trained by using linear SVM, and the following extreme financial investment risk models can be obtained:

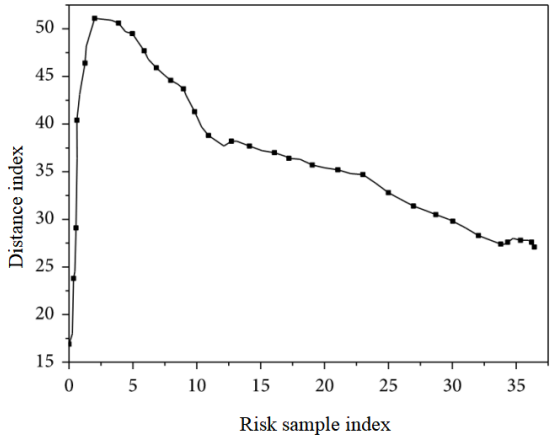
$$I(X;Y) = \sum_{y \in Y} \sum_{x \in X} p(x,y) \log\left(\frac{p(x,y)}{p_1(x) p_2(y)}\right) \quad (12)$$

Based on the breakthroughs in data generation, collection, storage and calculation of computers, Internet and Internet of Things, the development of artificial intelligence will also evolve from "simple algorithm + database" to "machine Learning + deep understanding". According to the different degrees of intelligence, AI can be divided into three stages: computational intelligence, perceptual intelligence and cognitive intelligence. As a result of the change of fund manager and head of research department, the investment style of the company has changed greatly, and the

investment performance has also been affected. If a fund company can model the company's investment philosophy through artificial intelligence technology, and realize smart learning in long-term practice, promote the evolution of the model, and realize the sublimation of the company's investment philosophy in the evolution of the model, it can be fully competitive. In the fund management industry, the core competitiveness is continuously strengthened. After years of development, China's online payment has become one of the most mature sub-sectors in Internet financial activities, and provides a basis for the intervention of financial technology in various industries in the future. At this point, the development of the Chinese market is leading. Coupled with the Internet-based online banking service model, smart investment caters to the needs of current individual investors, especially in line with the investment preferences of the younger generation.

The basic idea of SVM is to create a classification hyperplane as the decision surface, maximizing the isolation edge between the positive and negative examples. As shown in Figure 7. The distance between the two hyperplanes is called the classification interval, and the classification intervals between the two hyperplanes to the classification hyperplane are equal. The goal of the SVM is to maximize the classification interval between 1H and 2P, thus obtaining the expression of the classification hyperplane H, the decision function.

Figure 7
schematic diagram of SVM



In the future, as perception intelligence enters the popularization stage in China, artificial intelligence will change the production methods of various industries, such as manufacturing in the industrial sector, irrigation in the agricultural sector, and education, finance, transportation, and medical services in the service industry. , cultural and sports entertainment, public management and other aspects. At present, value investment is gradually returning, and long-term funds such as pensions are conducive to supporting the continuation of value style. For the current investment, we should focus on the value stocks with low valuation and ability to sustain performance, and realize the stable appreciation of the fund assets. Looking forward to the wide range of value, based on this investment logic, using artificial intelligence to achieve intelligent learning, the realization of the evolution of investment philosophy, to bring excellent returns to investors, but also set a benchmark for artificial intelligence empowerment finance. The basic analysis of each financing stage or lending object of a company before its listing, as well as the analysis of industrial format and competition pattern in the real economy. With this technology, some of the original low-end analysis activities will be replaced by a large area. Secondly, AI refers to the attempt to predict the future and reduce risks on the basis of domain modeling and large data analysis. From the development conditions of intelligent investment, we can see that compared with traditional investment, the combination of AI and traditional financial investment theory makes intelligent investment have many advantages, such as simplified process, personalized, low threshold and cost, high transparency of information, which also promotes the gradual popularization of intelligent investment in the world.

CONCLUSION

In this paper, two main intelligent investment models are proposed based on multi-step factor analysis and artificial intelligence classification. Firstly, the principal component analysis method and multi-step factor analysis method are used to select the variables of the initial 28 Financial

indicators, and the factor analysis model of financial early warning is determined. Secondly, the single classification model of artificial intelligence and the single classification model of artificial intelligence based on factor analysis are designed. The empirical results show that the artificial intelligence single classification model based on factor analysis has better performance than the single intelligent classification model, such as fitting ability, generating ability and model stability. The performance test results show that under the synergy of two operators, we can adjust our global ability and local ability at the right time, and obtain higher global optimization ability, convergence speed and solution accuracy. Based on the above analysis, this paper believes that the intelligent investment model based on artificial intelligence is the best operational tool and method for financial risk management departments and investors to deal with and prevent extreme financial risks. For the financial risk management department, the model can be used to accurately predict the extreme risks of financial markets in the future, and timely formulate and implement relevant macroeconomic policies to deal with financial risk crises, thus building a "firewall" for financial market extreme risk crisis.

Human Subjects Approval Statement

This paper did not include human subjects.

Conflict of Interest Disclosure Statement

None declared.

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