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Model of Financial Reimbursement Image Management System Based on Machine Learning Algorithm and Computer Vision Technology

Yuening Wang[1,*], Linlin Zhang[1] and Hao Tang[2]
[1] Planning and Finance Department, Yunnan Power Grid Co., Ltd, Kunming, Yunnan, 650000, China
[2] Information center, Yunnan Power Grid Co., Ltd, Kunming, Yunnan, 650000, China
Corresponding authors: (e-mail: lostangel8752@163.com).

Abstract In the current financial management, there are problems of low efficiency and inaccurate analysis data, which have brought great inconvenience to the financial management, thus greatly hindering the development of enterprises. Machine learning algorithm and computer vision technology have many applications at present, and also have applications in finance, but no one has applied them to the model of financial accounting image management system. Based on this, this paper applied machine learning algorithm and computer vision technology to the model of financial accounting image management system. This paper first introduced the application of the reimbursement system management method, and then analyzed the the current issues in financial management. Next, it introduced the machine learning algorithm and computer vision technology, and designed the model of the financial reimbursement image management system. Finally, the application effect of the model of financial reimbursement image management system was analyzed. This paper compared and analyzed the model of the general financial reimbursement image management system and the model of the financial reimbursement image management system proposed in this paper. It was concluded that the model of financial accounting image management system oriented to machine learning algorithm and computer vision technology has better operation convenience compared with the model of general financial accounting image management system, which can greatly improve the accuracy of analyzing financial accounting data and the risk prevention and control ability of the financial management department. The effect of financial management also improved, and the satisfaction of employees with profit distribution management increased by 29%. It can be applied to financial management in the future to improve the effect of financial management.

Index Terms Financial Management, Machine Learning Algorithms, Computer Vision Technology, Reporting Image Management System

I. Introduction

Financial management is often faced with the problem of disorder of the reimbursement system, which brings great difficulties to financial management. Moreover, many financial management departments have problems due to imperfect systems, lack of management personnel and low efficiency of reimbursement business approval, which is not conducive to the development and progress of enterprises. In this context, it is necessary to improve the current model of financial reimbursement image management system.

Some scholars have analyzed and studied financial management. Chen Ciao-Wei analyzed the comparability of financial statements and the efficiency of acquisition decision [1]. Sun Weichang analyzed the role of financial performance in institutional transformation and corporate social responsibility accounting [2]. Buallay Amina compared the level of sustainable development reimbursement and its impact on operation, finance and market performance of manufacturing and banking industries [3]. Atmadja Anantawikrama Tungga investigated the factors affecting the accountability of rural financial management. These factors include human resource capacity, assistance and monitoring [4].

Bialowolski Piotr used binary survey data to check the relationship between family financial management and financial knowledge of trade union partners [5]. Tkachenko Volodymyr studied the development process and efficiency of managing the financial potential of enterprises under the modern market conditions, that is, it has been determined that financial potential is a basic element, and realizing and maintaining a high level of financial potential is conducive to improving productivity, thus promoting profitable activities and maximizing profits. Facts have proved that increasing the financial potential and ensuring the absolute stability of the market would lead to

the strengthening of competitiveness, investment attraction, the interests of stakeholders and further entry into the international market [6]. The current analysis on financial management has not yet addressed the model for building a financial reporting image administration system.

Machine learning algorithms are also applied in the financial and financial fields. Abdullah Mohammad analyzed the significance of machine learning for financial solvency prediction [7]. Jagtiani Julapa analyzed the role of alternative data and machine learning in financial technology lending [8]. Gu Shihao compared and analyzed the machine learning methods of finance. Its research background is the most widely studied issue in the financial field, namely the issue of measuring stock risk premium [9]. Lee In outlined three cases of the development of machine learning in the field of financial services, and discussed the challenges that all managers must face when deploying machine learning applications [10]. There is no research on combining machine learning algorithm with computer vision technology.

This paper used machine learning algorithm and computer vision technology to improve the model of the financial reporting image management system, and compared and analyzed the operation convenience, analysis accuracy, risk prevention and control ability and financial management effect of the model of the general financial reporting image management system and the model of the financial reporting image management system proposed in this paper. After obtaining the model of financial accounting image management system based on machine learning algorithm and computer vision technology, the operation convenience and analysis accuracy of each financial management department were better than the model of general financial accounting image management system, and the risk prevention and control ability and financial management effect of the financial management department were also improved. After that, compared with other people's achievements, this paper applied machine learning algorithm and computer vision technology to financial analysis.

II. Application of Reimbursement System Management Method

The application of the reimbursement system management method to financial management is conducive to strengthening the supervision of the use of funds, and can effectively reflect the timeliness of financial information, which can promote the cooperation between departments, thus improving the level of financial personnel. The application of the reporting system management method is shown in Figure 1.

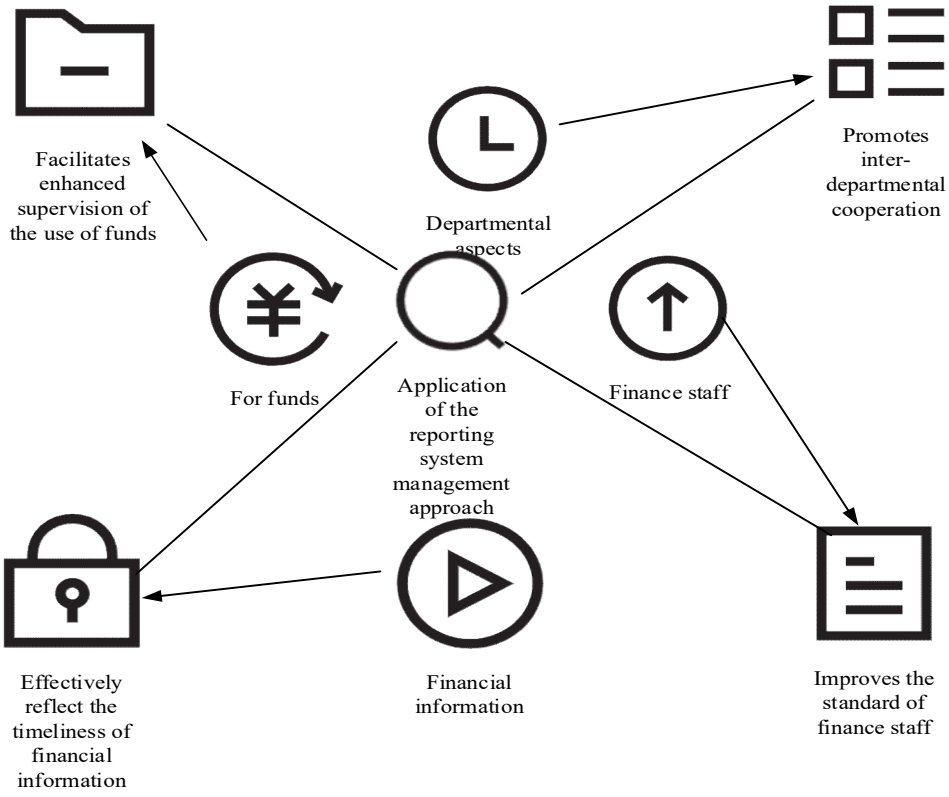


Figure 1: Application of the reporting system management approach

II. A. Strengthening of Supervision Over the Use of Funds

In the traditional financial management model, each company operates as an independent financial management entity [11]. The head office cannot effectively supervise the performance of subsidiaries, and can only supervise subsidiaries through internal audit at the end of the year. The initial post-supervision of subordinate units has been changed to pre-supervision, so that the headquarters can accurately understand the use of funds of subordinate units, which is conducive to the control of funds. This effectively prevents the funded people from paying attention to the project progress and ignoring the use of funds, and encourages them to use the company's funds better, so as to use the funds more controlled and targeted.

II. B. Timeliness of Effective Reflection of Financial Information

The introduction of financial reimbursement management system can better reflect the timeliness of the company's financial information [12]. The company can make decisions on the activities of its subsidiaries in real time according to the use of its capital. The company headquarters can make new decisions and change outdated decisions in a timely manner based on the financial information reported.

II. C. Promotion of Cooperation between Departments

The main advantage of the financial management reimbursement system is that the group headquarters can integrate the resources of all structures according to the financial situation of each structure, which can strengthen the cooperation between different departments, thus realizing the optimal allocation of resources [13].

II. D. Improvement of the Level of Financial Personnel

After the implementation of financial reimbursement management, in order to facilitate the central financial office to deal with the financial problems of each unit, each subordinate financial department usually assigns financial management personnel to contact the financial center according to the actual situation of the unit. These financial management personnel need to update their professional knowledge and improve the level of policy and theory, so as to change the working methods of implementing the financial management system, which also puts forward higher requirements for the service quality and awareness of financial personnel.

III. Problems in Current Financial Management

The current problems in financial management are shown in Figure 2.

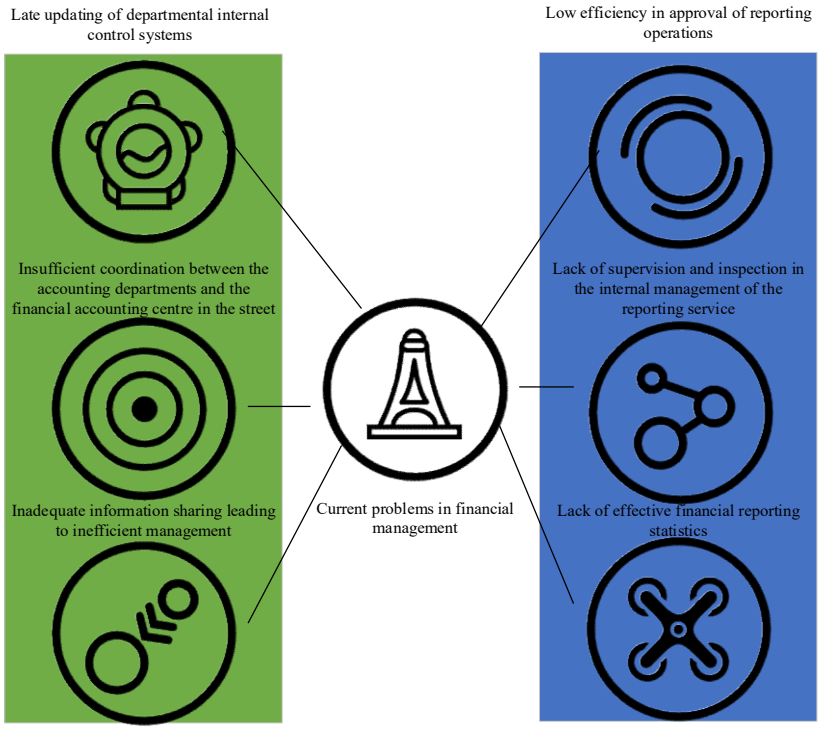


Figure 2: Current problems in financial management

III. A. Backward Updates of the Department's Internal Control System

Many enterprises have not established an appropriate financial management system, or even directly used the previous internal control system [14]. After the introduction of the financial management system, one of the financial management personnel held two positions, namely auditor and financial director, which violated the separation principle of incompatible responsibilities in the internal control principle.

III. B. Inadequate Cooperation between Accounting Departments and Financial Accounting Centers

All accounting units and financial accounting centers are particularly obvious in terms of insufficient cooperation in the street and poor communication and exchange of financial information [15]. For example, some companies have too many invoices and the invoices are not standardized; the financial accounting center cannot find out the reason and prepare the reimbursement in time; when some units found the defects and errors of the Finance and Reimbursement Center, they did not provide feedback to the Finance and Reimbursement Center in time.

III. C. Low Management Efficiency Caused by Insufficient Information Sharing

The use of paper reimbursement makes it impossible to synchronize information between departments at all levels in real time. At present, the administrative departments at all levels have to report to the higher administrative departments for reimbursement on a regular basis, and can enter the reimbursement procedure only after being reviewed by the higher administrative departments. Paper-based administrative management has led to a lot of inefficient work, including filing documents, packing reimbursement data in boxes, and managing in sub-departments. The paper-based management method also makes it difficult to find information, because the company's employees have to find information about a certain reimbursement in a large number of paper documents.

III. D. Low Efficiency of Reimbursement Business Approval

It is very time-consuming for users to prepare annual reimbursement. Different reimbursement companies have different approval procedures. The same company has to approve several sub-projects before final approval of reimbursement, which leads to serious delay, and the phenomenon that the invoices for reimbursement in the current year are several years late.

III. E. Lack of Supervision and Inspection on Internal Management of Reimbursement Service

Since the introduction of the financial management reimbursement method, the responsibility for reimbursement is no longer borne by the unit, and the staff has resisted the financial information. Some people unilaterally believe that the financial department has been cancelled and there is no need to control and manage it.

The internal reimbursement staff's poor management of the service would lead to an increase in complaints, which would affect the staff's experience. A comprehensive control and audit mechanism is needed to improve the quality of financial reporting, and a well-designed financial statement user authentication mechanism is needed to improve the effectiveness of accountability management.

III. F. Lack of Effective Financial Reimbursement Statistics

Due to the lack of a comprehensive and complete financial reimbursement image management system, some information and statistical data can not be obtained in time, and managers at all levels lack effective analysis of real-time data, which affects the expansion and formulation of training resource allocation strategies.

IV. Machine Learning Algorithm and Computer Vision Technology

Vision is the most effective way for human beings to perceive information. It provides people with a lot of information about their surrounding environment, and allows intelligent interaction with the external environment without physical contact. As the society enters the era of multimedia communication and high-speed Internet, financial accounting image management would continue to innovate and develop in the direction of technology, interactivity, diversity, networking and virtualization.

IV. A. Machine Learning Algorithm

Machine learning is carried out according to the following basic steps: firstly, a training database is defined and used to train or learn a model and create a learner; secondly, a validation database is used to evaluate learners' performance and select a model; the final model is used to predict from the test data and produce the prediction results. The ultimate goal of machine learning is to ensure that the learning or training model performs well on the new samples, that is, it has a strong generalization ability and avoids over-fitting or under-fitting. Over-fitting is caused by over-learning. It has good prediction of known information and poor prediction of unknown information,

which weakens learners' generalization ability. This is a major obstacle to machine learning, and its risks need to be mitigated and reduced.

IV. B. Computer Vision Technology

Computer vision technology, also known as machine vision, which uses digital cameras and computers instead of human eyes to detect, track and measure objects, and then processes images on the computer to produce images that are more suitable for human eyes to observe or transmit to sensing devices. Computer vision is a key issue in the field of artificial intelligence, and its focus is to use computers and related equipment to simulate human vision. Computer vision focuses on the theory of artificial intelligence system, that is, the theory involved in extracting information from images and understanding the semantics of images.

Computer vision makes computers more intelligent. With the help of this technology, computers can see everything in the world with vision as well as humans, and can adapt well. However, it takes a lot of time and effort to achieve this goal.

The applicability of computer vision technology is very good, especially in industrial applications. The effect of incorporating computer vision technology is very good, and the cost is relatively low. At the same time, it has a certain non-contact ability. It can obtain a large amount of information without distance restrictions. The effect of computer vision technology is general, and it is applicable to a wide range of industrial applications. Computer vision should be considered. Computer vision is also applied to the development of mobile robots. It mainly uses waveform templates to capture the human form, then scans the image, and successfully completes the waveform conversion, so as to recognize this person.

In recent years, computer vision and machine learning technology have been applied more and more widely in the field of image management. At the same time, machine learning theory has been widely used in the research field of intelligent 3D human animation. In addition, the combination of machine learning technology and computer vision is also used in the model of financial accounting image management system.

V. Model of Financial Reimbursement Image Management System

V. A. Network Topology

The system network has a polygonal structure. All data are stored on the top server. The top and bottom users access the server through the web browser to process transactions.

V. B. System Operation Mode

The system adopts a more mature browser/server model and does not need to install clients or plug-ins. Users can access the system through a web browser to read data from the server and conduct transaction processing.

V. C. Functional Design

Even in the case of success, problems often occur in this process, such as incorrect reimbursement forms and checking the reimbursement amount, which may lead to incomplete reimbursement. In addition, these need to be revised as appropriate. Therefore, in the whole reimbursement process, most of the time is spent on reimbursement, review and obtaining the signature of the management personnel, which waste the time and energy of the reimbursement personnel.

The model of financial reimbursement image management system has two main functions and two additional functions. The first is the pre-authorization function (main function). The past expenditure requests of subordinate departments can be completed online and sent to the superior departments through the network. The superior departments can approve and provide feedback in real time. The second is the reimbursement and audit function (core function). The branch uses a scanner to scan and process receipts, documents and image attachments, and upload them to the head office server through the controller. The management of the branch company reviews the expenditure of the subordinate branch company through the website and signs in time to make the financial reimbursement "paperless". The third is information function (additional function). With the query function of the system, superior and subordinate departments can view financial information such as financial receipts, original vouchers and supporting materials in real time, so as to standardize the expenditure of subordinate departments and strengthen their financial management. The fourth is the statistical function (additional function).

In addition to the above services, it also includes query system, system management, financial statistics, user management and login system. These services are added to improve the management of the system and make it more convenient for users. Its functions can be summarized in Figure 3.

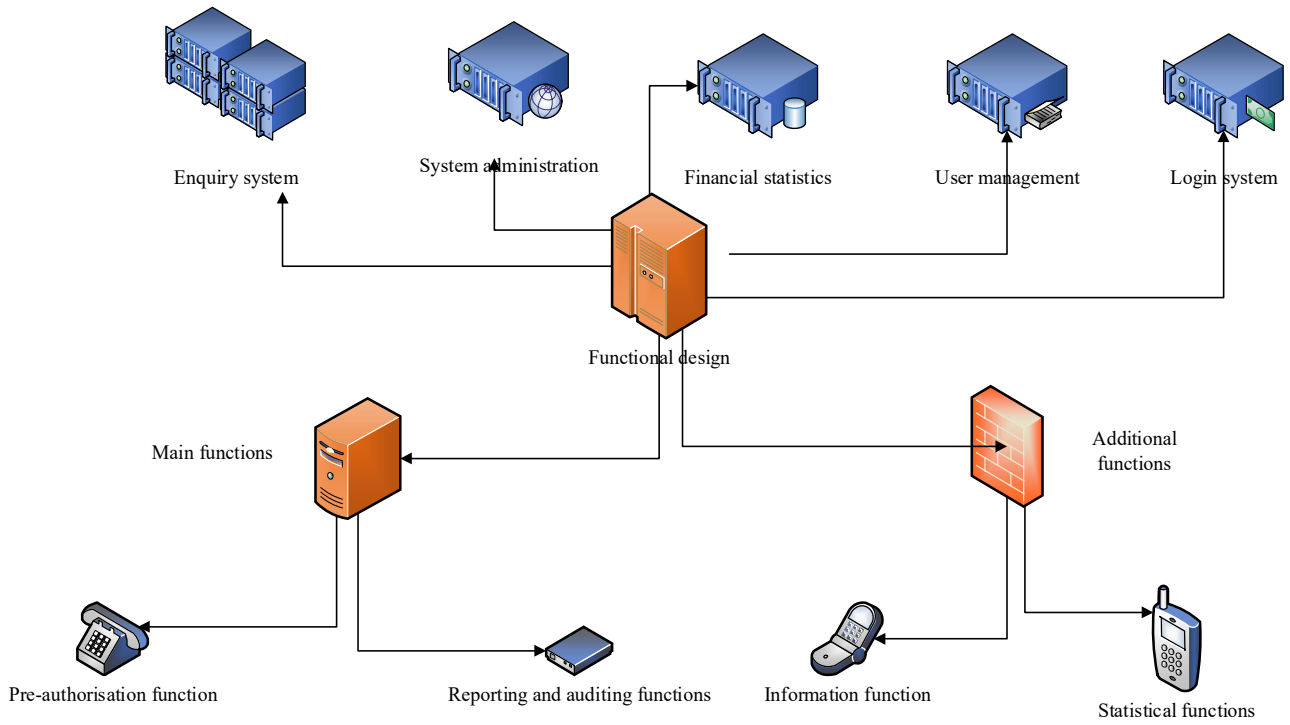


Figure 3: Functional design

V. D. Main Business Processes

V. D. 1) Handling of Prior Approval

The branch staff fill in the pre-authorization form online through the website, and send it to the financial director and the branch manager for approval. After that, the department would transfer it to the superior department for approval. If there are attachments that need to be prequalified, they can be scanned and uploaded with a scanner and attached to the pre-qualification form. The superior department can view the contents and attachments of the pre-qualification form through the website, and then the financial director signs for processing. After that, they are sent to the financial director and the superior department head for approval. The head of the finance department shall send the approval to the subordinate departments for implementation. The rejected decision would be sent back to each level, so that each level would be informed of the reasons for the rejected decision.

V. D. 2) Processing of Image Reimbursement

The first step is initial scanning and uploading (operation by subordinate departments). When the subordinate department needs to report financial records to the superior department, the staff of the subordinate department first scans the financial documents, documents and image attachments, and then uploads them to the server in batches through the download manager on the website. One of the financial files can also directly import the data exported from the financial system into the image file system through the data interface. The second step is data connection (lower level branch operation). Through the data link interface, the uploaded images are grouped and numbered as financial documents, documents and attachments.

V. D. 3) Enter (Generate) Reimbursement Write-off Table and Reimbursement Register (Subordinate Department Operation)

Subordinate personnel of the branch company would enter the depreciation reimbursement table according to the actual reimbursement data, or automatically generate the depreciation reimbursement table according to the imported financial file. The system automatically generates the number of copies of financial documents and the number of file attachments in the reimbursement records based on the data link.

V. D. 4) Financial Directors and Sub-heads of Subordinate Departments

The bank manager checks the contents of the reimbursement (branch business). Financial management personnel and leaders in charge can review and sign the contents of this reimbursement on the website, including supporting documents, attachments and appendices.

V. D. 5) Audit of Reimbursement Content by the Reimbursement Auditor of the Superior Department (Operation of the Superior Department)

The auditors of the superior organization review the contents of the reimbursement one by one and may take actions, such as approving the audit, returning the reimbursement to complete the audit, or refusing the audit.

V. D. 6) Review of Reimbursement Content by Financial Director of Superior Department (Operation of Superior Department)

The financial director of the headquarters can also review the contents of the reimbursement and related reimbursement, and sign the opinions on the transaction on the audit register.

V. E. System Implementation

V. E. 1) Business Representative and Responsible Person Apply for Bill Management

(1) Management of management type: The main purpose of management account type is to facilitate the management of system users. Different account lists are divided into different item types, which is convenient for future requirements on account lists, and also for cost statistics of different types of account lists.

(2) Request for invoicing: When a trader or responsible person adds a billing application, the trader or responsible person can isolate the billing list into appropriate item types according to the previously added item types, which can be further processed. In particular, the reimbursement list should include the type of reimbursement, the quantity of reimbursement, the brief description of the reimbursement content and the attachments (including attachments) of the reimbursement.

V. E. 2) Responsible Person and Financial Personnel Review the Bill

The person in charge can check whether the claim form submitted by the supplier is correct. If it is not correct, it would not be approved and the financial personnel would not reimburse. This would prevent the wrong claim form from being submitted, thus causing economic losses to the company. The financial personnel would review the invoice list approved by the person in charge, and check whether the reimbursement meets the reimbursement requirements.

V. E. 3) Financial Personnel Manage Bills

The main purpose of the financial director's account management is to approve and distribute the audited reimbursement list to avoid collusion, and manually enter or batch import some manual reimbursement lists. In order to avoid system errors and loss of reimbursement records, and ensure paper backup, historical reimbursement accounts are exported and archived.

VI. Application Effect of the Model of Financial Reimbursement Image Management System

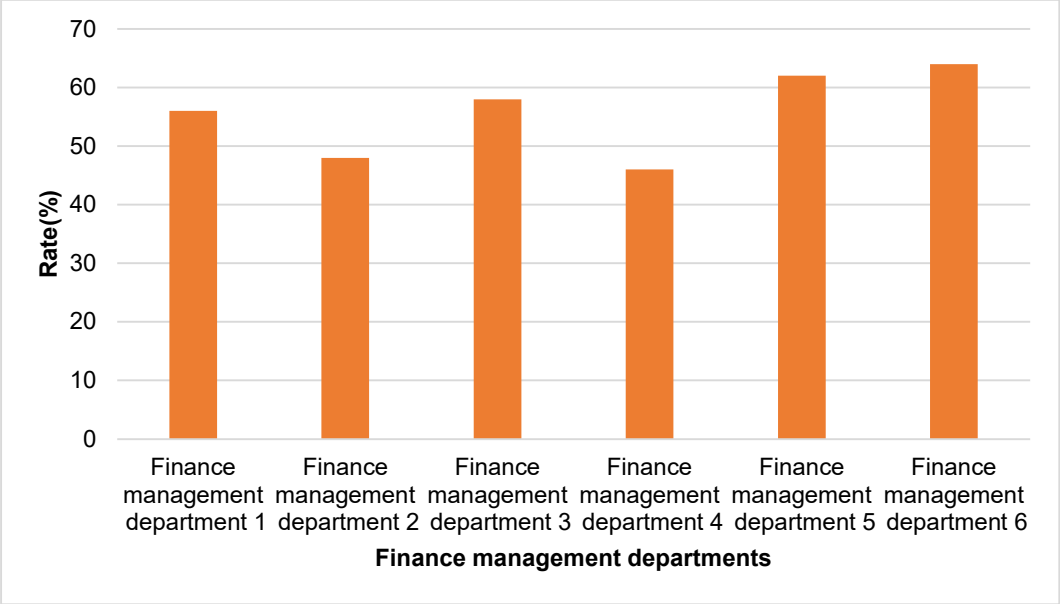
In order to improve the management effect of financial reporting, this paper selected 6 financial management departments, and analyzed their financial reporting management effect. The basic information of the financial management department was recorded in Table 1.

Table 1: Basic information on the finance sector

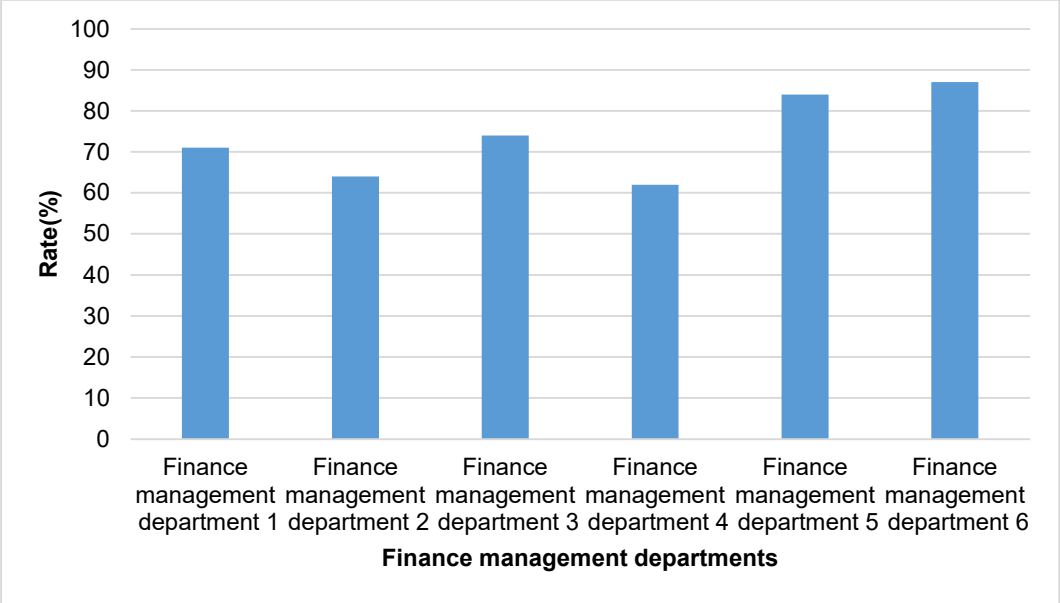
Finance management departments	Problems
Finance management department 1	Departmental internal control system is outdated
Finance management department 2	Insufficient coordination between the accounting departments and the accounting centre
Finance management department 3	Weak accounting of departmental heads
Finance management department 4	Insufficient information sharing leading to low management efficiency
Finance management department 5	Low efficiency in approval of reporting operations
Finance management department 6	Lack of effective financial reporting statistics

VI. A. Operation Convenience

This paper designed a model of financial accounting image management system based on machine learning algorithm and computer vision technology. The purpose is to make financial reimbursement more convenient and convenient, so as to save the manpower and material resources of financial management personnel. The results of the ease of operation of the model and general financial reporting image management system using machine learning algorithm-oriented and computer vision technology are recorded in Figure 4.



A. Ease of the model using the general financial reporting image management system



B. Ease of operation using the model of financial reporting image management system proposed in this paper

Figure 4: Ease of use of different financial reporting image management systems

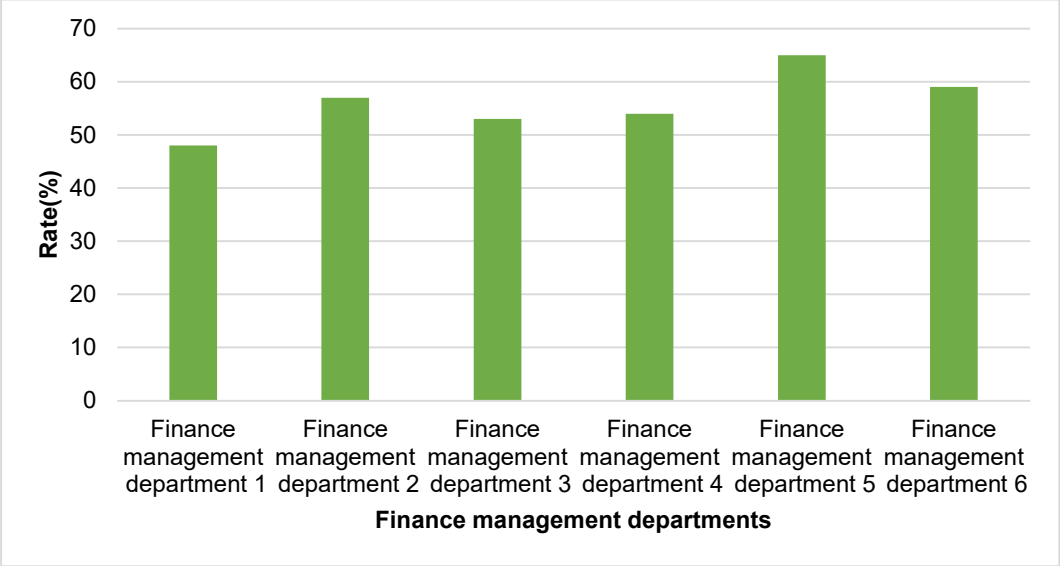
Figure 4A represents the operation convenience of the model of the general financial reimbursement image management system, and Figure 4B represents the operation convenience of the model of the financial reimbursement image management system proposed in this paper.

When using the general model of financial reimbursement image management system, the operation convenience of financial management department 1 was 56%, and that of department 2 was 48%; the operation convenience of department 3 was 58%, and that of department 4 was 46%; the operation convenience of department 5 was 62%, and that of department 6 was 64%. However, when adopting the model of financial reimbursement image management system oriented to machine learning algorithm and computer vision technology, the operation convenience of financial management department 1 was 71%, and that of department 2 was 64%; the operation convenience of department 3 was 74%, and that of department 4 was 62%; the operating convenience of department 5 was 84%, and that of department 6 was 87%. Compared with the general model of

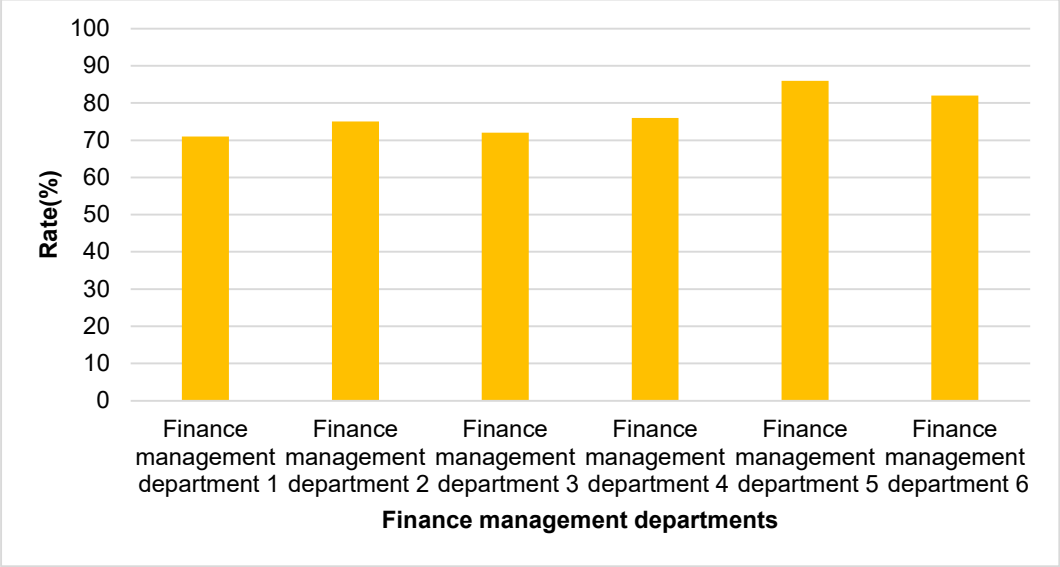
financial accounting image management system, the model of financial accounting image management system oriented to machine learning algorithm and computer vision technology has better operation convenience.

VI. B. Accuracy of Analysis

There is a lot of data in the financial reporting analysis, so there is a problem in the accuracy of analysis. Based on this, the model of the financial reporting image management system for machine learning algorithm and computer vision technology proposed in this paper improved the accuracy of analysis, so the analysis accuracy of different financial reporting image management systems was used for analysis. The results was recorded in Figure 5.



A. Analytical accuracy of the model using the general financial reporting image management system



B. Analytical accuracy of the model using the financial reporting image management system proposed in this paper

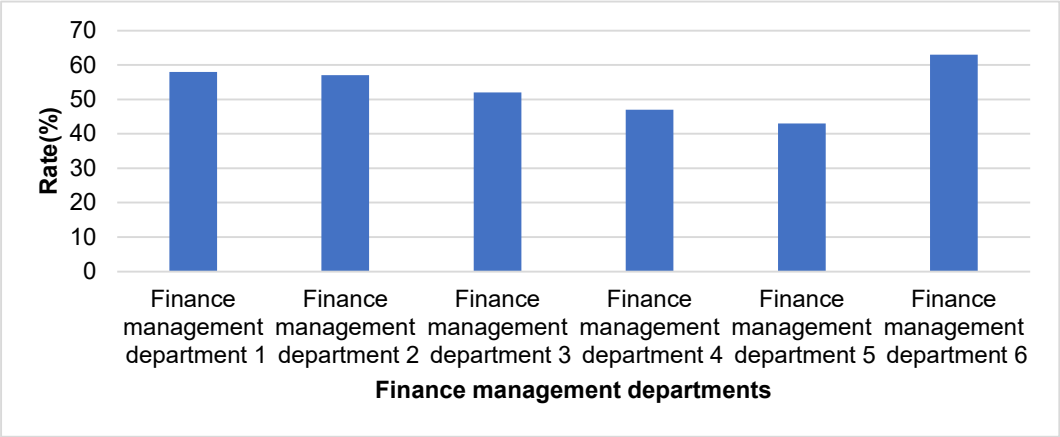
Figure 5: Analytical accuracy of different financial reporting image management systems

Figure 5A represents the analytical accuracy of the model of the general financial reimbursement image management system, and Figure 5B represents the analytical accuracy of the model of the financial reimbursement image management system proposed in this paper. When using the model of general financial reimbursement image management system, the analysis accuracy of different financial management departments

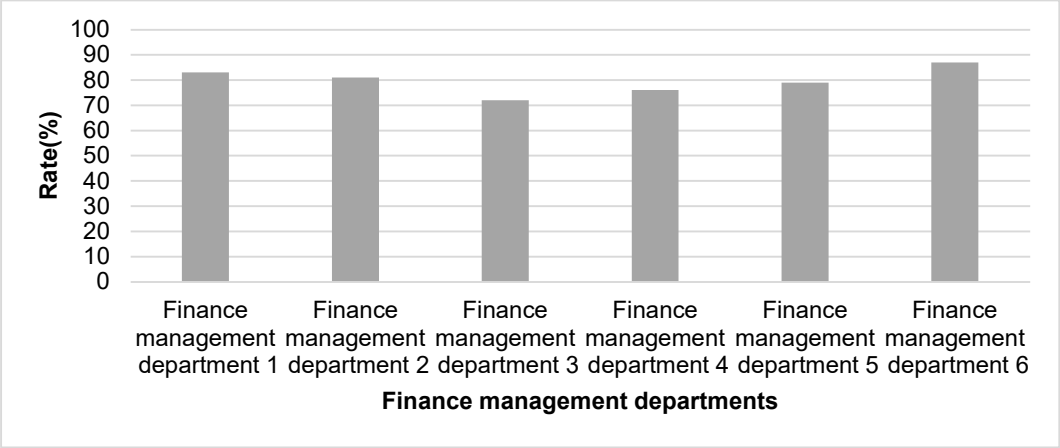
was less than 70%. However, when using the model of financial accounting image management system based on machine learning algorithm and computer vision technology, the analysis accuracy of different financial management departments was higher than 70%. Therefore, using machine learning algorithm and computer vision technology can greatly improve the accuracy of the model analysis of financial accounting image management system.

VI. C. Risk Prevention and Control Capability

In the market, enterprises are facing pressure and challenges from all aspects. The most important way to prevent and avoid capital risk is to conduct financial analysis. Through scientific and comprehensive financial analysis, conclusions and inferences can be drawn from the company's current financial data, and the business situation and development trends can be understood. By finding and solving the current financial problems, enterprises can achieve the purpose of preventing and resisting financial risks, which can provide an important guarantee for the long-term sustainable development and healthy operation of enterprises. The research results of the risk prevention and control capability of the model of the financial reimbursement image management system were recorded in Figure 6.



A. Risk prevention and control capability of the model using the general financial reporting image management system



B. Risk prevention and control capability of the model using the proposed financial reporting image management system

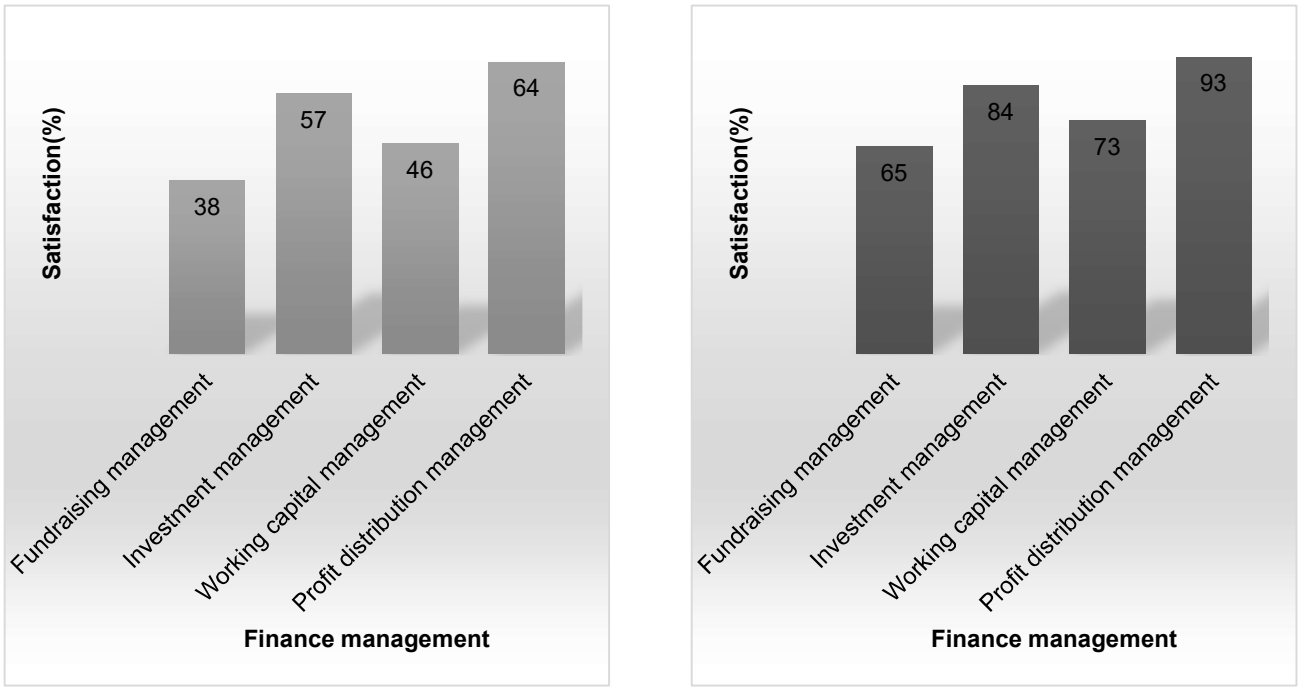
Figure 6: Risk prevention and control capabilities with different financial reporting image management systems

Figure 6A represents the risk prevention and control capability of the model of the general financial reporting image management system, and Figure 6B represents the risk prevention and control capability of the model of the financial reporting image management system proposed in this paper.

When using the general model of financial reporting image management system, the risk prevention and control ability of each financial management department was at a low level. The financial management department 6 had the highest risk prevention and control ability, and the department 5 had the lowest. However, when adopting the model of financial reporting image management system based on machine learning algorithm and computer vision technology, the department with the highest risk prevention and control ability was still the financial management department 6, while the department with the lowest risk prevention and control ability became the financial management department 3. However, in general, compared with the general model of financial accounting image management system, the model of financial accounting image management system oriented to machine learning algorithm and computer vision technology can greatly improve the risk prevention and control ability of the financial management department.

VI. D. Financial Management Effect

In order to analyze the effect of financial management, this paper selected a total of 100 employees working in six financial management departments for analysis. The financial management effects of different financial reimbursement image management systems were analyzed, and the results were recorded in Figure 7.



A. The financial management effect of the model with the general financial reporting image management system

B. The financial management effect of using the model of financial reporting image management system proposed in this paper

Figure 7: Financial management effects of different financial reporting image management system models

Figure 7A represents the financial management effect of the model of the general financial reimbursement image management system, and Figure 7B represents the financial management effect of the model of the financial reimbursement image management system proposed in this paper.

After adopting the model of financial reimbursement image management system based on machine learning algorithm and computer vision technology, the employee's satisfaction with financing management increased from 38% of the model using the general financial reimbursement image management system to 65%, an increase of 27%; employee satisfaction with investment management increased from 57% of the model using the general financial reimbursement image management system to 84%, up 27%; employees' satisfaction with working capital management increased from 46% of the model using the general financial reimbursement image management system to 73%, an increase of 27%; employees' satisfaction with profit distribution management increased from 64% of the model using the general financial reimbursement image management system to 93%, an increase of 29%. After adopting the model of financial reimbursement image management system based on machine learning

algorithm and computer vision technology, employees' satisfaction with profit distribution management improved the fastest, and the profit distribution management had the best effect.

VII. Conclusions

In order to improve the effect of financial accounting management, this paper used machine learning algorithm and computer vision technology to improve the model of financial accounting image management system. At the same time, experiments were designed to compare and analyze the convenience of operation, accuracy of analysis, risk prevention and control ability and financial management effect of the model Finally, the conclusion was reached. The financial management departments were analyzed. It was found that the operation convenience and analysis accuracy of the model were better than those of the general financial reimbursement image management system, and the risk prevention and control ability and financial management effect of the financial management department were also improved. Collectively, it seems that the usage of machine learning algorithms and computer vision technology can greatly improve the financial reporting management and achieve the expected results.

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