

# Audit Optimization Based on Computer Vision Technology

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## Abstract

**Research Purposes:** The project is based on the traditional accounting audit platform, on the basis of technical research, to re-create a three-party relationship, widely used data platform. **Research Methodology:** We use the SQL Server database data storage principle, the original documents and other first-hand information direct electronic storage. **Research Results:** It will not only increase file sharing and privilege management algorithms, but also prevent first-hand data modification, and the use of more intelligent embedded management of various modules to protect the three parties to exercise their legitimate rights and interests on the platform.

## Keywords

Audit Platform, Computer Vision Technology, Information

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## 1. Introduction

### 1.1. Background

The audit work has been a difficult point for accounting firms and large companies, the process is complex and cumbersome, every year in the audit inspection will cost a large number of human and financial resources. China needs a lot of audit business every year, which brings huge costs, so there is a huge market demand for audit optimization platform.

### 1.2. Literature Review

Viewed from the perspective of Mushiirah [1], the traditional audit process is based on the development of technology, mainly through computer vision-based

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scanner, data into electronic data and storage, to achieve the financial statements audit process of moderate traceability as a starting point for the establishment of a platform and the connection between users. Analyze the target data set according to the audit task and requirement. Liang li [2] pointed out that in the data analysis part, the data processing model is built in the background, and the data is processed by using the box-sorting method, the clustering algorithm, the association mining algorithm, the KNN (K-nearest Neighbor) classification algorithm and the statistical algorithm, etc., the audit platform can introduce audit evidence chain judgment, judge the common and common situations, optimize the construction of audit case base and method base algorithm, and deepen the application of audit results mining.

Some scholars focus on the problem of the audit work, and prepare to establish the data analysis platform [3]. As ZHAO Luda and his colleague said [4], nowadays, international community began to gradually establish and formulate the off-site audit working mechanism. According to the off-site remote audit theory of international business and the current situation of international business internal audit [5], the off-site audit working mechanism was established. According to the specific situation of the audit object, specific audit dimensions were designed, and specific inspection objectives and procedures were proposed, so as to carry out specific off-site remote audit work.

According to Z. Wang [6], the audit optimization platform based on computer technology is an audit optimization platform integrating computer technology, big data technology and AI technology. It is an audit optimization platform specially developed to simplify the complex and tedious audit process. Li, Le [2] viewed that the audit work has always been a difficult point for all accounting offices and major companies. The process is complex and tedious, which will consume a lot of manpower and financial resources in the audit inspection every year. Zhang, H [7] founded that China needs numerous audit services every year, resulting in huge costs, which shows that there is a huge market demand for audit optimization platforms.

Some scholars have a consensus that nowadays the audit industry needs to establish a third-party data platform [8], which can not only become a reliable database for third-party auditors to evaluate the audit unit, but also a benchmark for shareholders to supervise the work of management. By embedding such decentralized technologies as block chain in the platform, primary data such as original vouchers and accounting books can not only be directly stored electronically when they are obtained, but also can prevent primary data from being modified by virtue of the characteristics of block chain technology; in addition, AI technology is added to intelligently audit the data through AI technology, so as to maximize the interests of the stakeholders, management and the audit unit.

As Wang, S [9] showed in his paper through the development of audit platform, the audit process can be electronic and intelligent, which can not only effectively improve its accuracy, greatly simplify the audit process, reduce the loss of human and material resources in the audit process, and reduce the manage-

ment costs of enterprises. It is an audit optimization platform that can meet the needs of enterprises to control the flow and exchange information.

### **1.3. Innovation**

We are going to solve the problems such as the loss of accounting documents, the complexity of the traditional paper documents reimbursement process, the difficulty for the management to know the internal financial status of the enterprise in time, and the low efficiency. The application of block chain in the platform ensures the security and authenticity of the extracted data in the process of audit, and the data on the chain is not easy to be tampered with, so as to improve the authenticity of the audit voucher information.

## **2. Methodology**

### **2.1. Analysis of the Hardware Part of the Audit Platform**

The upper cover of the glass plate lamp lens of the scanning head of the charge coupled device (CCD) array reflector. The filter stepping motor balance bar drive belt power interface port control circuit is combined, and the core component of the scanner is the CCD array. CCD is the most commonly used technology in the field of scanner image capture. CCD is composed of a large number of tiny photo diodes, which can convert photons (light) into electrons (charge).

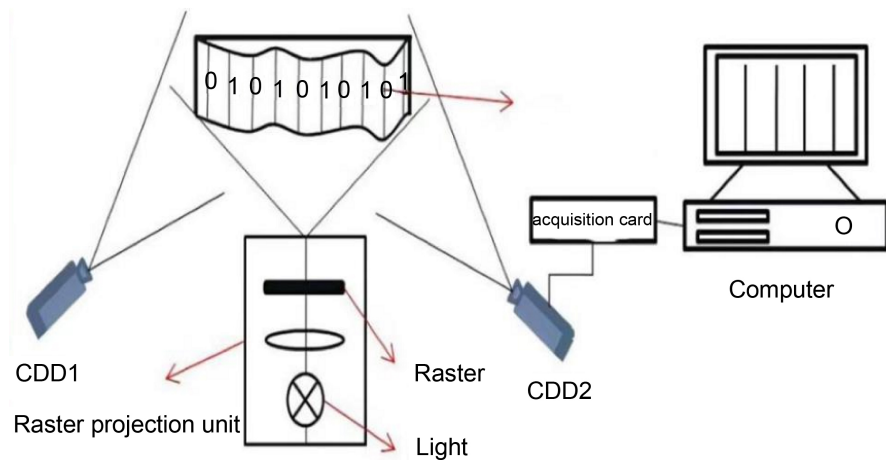
These diodes are called light dots. In short, each light spot is sensitive to light the brighter the light incident on a single light spot, the more charge accumulated in the light spot. According to Zhang, M [10], at present, most of the audit work of accounting firms and enterprises is still carried out in the traditional mode, the audit process is very complicated, time-consuming, high human cost, need the guidance and operation of Audit, accounting-related professionals.

In contrast, through our platform, AI can replace Manual Direct Audit, auditors can be directly here to review, through the electronic storage of audited units accounting documents and other data, the enterprise can upload the business vouchers in real time on the platform, which greatly simplifies the audit business process and creates higher benefits for customers. The hardware part of the platform can be shown in **Figure 1**.

Target accounting firms and enterprises to demand customers, providing them with computer screens and electronic images instead of paper certificates, computer documents instead of paper journals and ledgers, flexible and diverse reports instead of regular reports, AI intelligent auditing instead of manual auditing and information sharing. The project has innovative technical personnel, while carefully developing computer-based systems to provide customers with a variety of transactions and account balances of the audit, Audit Test Process and audit reports of the business.

### **2.2. Computer Vision Principle of Product Hardware**

Two dimensional paradigm: many applications of computer vision involve two-



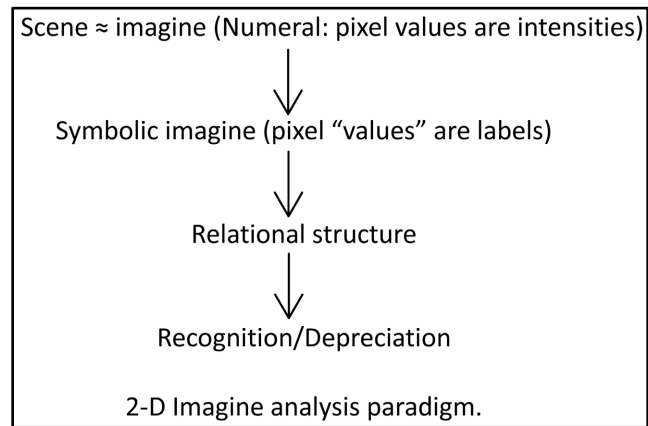
**Figure 1.** Hardware part of the platform.

dimensional scenes in nature. Examples include documents; high altitude landscape on the earth's surface (terrain fluctuation can be ignored); the specimen observed by microscope (the depth of field is very shallow, so only one slice of the specimen is the focus; and flat artificial surfaces. When the scene is two-dimensional, computer vision becomes simpler (although it may still be very important—for example, reading handwriting).

At the same time, some techniques for analyzing 2-D scene images are also useful in the early stages of 3-D scene analysis. Given the digital image of the scene, it is used to identify the general structure of an object's system. At the initial stage of development, deepen the construction of the internal system, build the database, follow-up product development, apply for technical patents, and continue to deepen the system technology. At the same time market development together, two-pronged approach, actively looking for partners. Enter the market development stage, and determine the strategy as follows: market-oriented, master the core technology, joint industry and industry leading enterprises, through strategic cooperation to get access to the audit industry qualification as soon as possible, and efforts to promote industrial transformation. The principle of computer vision based on two-dimensional image can be shown in **Figure 2**.

### 2.3. Algorithm Analysis

The binary classification algorithm, namely SVM algorithm, is used for image analysis. Relevance Vector Machine (RVM) is a Relevance Vector Machine of Micnacl E. Tipping proposed a sparse probability model similar to SVM (Support Vector Machine) in 2000, which is a new supervised learning method. The  $X_1$  coordinate is used as the audit barcode, and the  $X_2$  coordinate is used as the image pixel feature. Class A is the area of the audit sheet, and class B is the area of the non audit sheet. And use the linear regression equation to predict 1 and 0, judge whether this is an audit sheet, and the row is classified. If it is true, it will be divided into the class A area. If it is false, it will be divided into the class B



**Figure 2.** The principle of computer vision.

area, and then the correct class A will be filtered out. SVM algorithm for binary classification can be shown in **Figure 3**.

We can use the SVM algorithm in machine learning to know his error information, such as the major e-commerce platform of the same price data analysis, get a range of training through big data, then we can compare the data that their company writes to the data, and automatically identify that the data is incorrect, and automatically eliminate the same incorrect data. Using the binary classification algorithm (SVM) for image analysis, the  $X_1$  coordinate is regarded as the audit bill data, the  $X_2$  coordinate as the range of market data, and Class A as the range of audit data errors, class B is the correct scope for auditing. And using a linear regression equation to make a prediction of 1 and 0, to determine whether this is an audit right or wrong, and to categorize, if it's false, it goes into class A, if it's true, it goes into Class B, by filtering out the errors in Class A, we can get to the error data and remind the company of the existence of the error data, and can intuitively feedback to the major users.

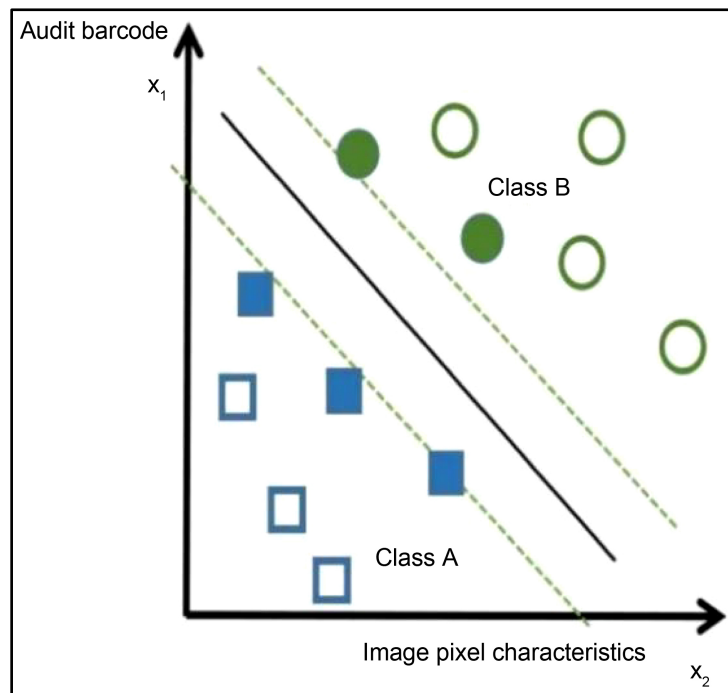
## 2.4. Methodological Theory

Empirical research method. The main aim of the empirical research method is to explain the relationship between various independent variables and a dependent variable. Quantitative Analysis Method. Quantitative analysis can make people's understanding of the object of study more accurate, in order to reveal the law more scientifically, grasp the essence, clarify the relationship, predict the trend of things.

## 3. Discussion

### Data Detection

By using the SVM algorithm in machine learning, the errors in the process of audit work can be detected. In the process of a variety of hand-written reports and bar codes, two-dimensional code information collection automation, data processing to form digital documents, unified Storage and management with



**Figure 3.** SVM algorithm.

traditional spreadsheet, using non-relational database technology, building data warehouse, massive data storage, using relational database to achieve user interface in the front-end, provide data query business. Machine learning algorithm is used to correlate, summarize and mine multi-source data to form a complete operation and financial data link. According to the task and requirement of the audit work, carry on the intelligent analysis to the operation and financial data, carry on the early warning to the data flaw in time.

To determine whether the audit is correct or wrong, and classify it. If it is false, it will be divided into the class A area. If it is true, it will be divided into the class B area. Then we will filter out the errors in the class A, so that we can get the wrong data, remind the company of the existence of wrong data, and can intuitively feed back to major users. The parameters of the data can be shown in **Table 1**.

- Accuracy: predict the proportion of correct samples in the total samples. The greater the accuracy, the better.
- Recall rate: among the results that are actually positive samples, the proportion that is predicted to be positive samples, the recall rate. The bigger the better.
- F1: Harmonized average of accuracy rate and recall rate. Accuracy rate and recall rate affect each other.

After testing, the data range is reliable in this range, which shows that this algorithm can save a lot of manual testing costs for audit work and improve work efficiency. The technology is developed on the basis of the traditional audit process, mainly through a computer vision-based scanner that converts bar code data

**Table 1.** Data parameter.

	Accuracy	Recall rate	F1
Training Set	1	1	1
Test Set	0	0	0

into electronic data and stores it, to achieve the financial statements audit process of moderate traceability as a starting point for the establishment of a platform and the connection between users. Analyze the target data set according to the audit task and requirement. In the data analysis part, the data processing model is built in the background, and the data is processed by using the box-sorting method, the clustering algorithm, the association mining algorithm, the KNN (K-nearest Neighbor) classification algorithm and the statistical algorithm, etc., the audit platform can introduce audit evidence chain judgment, judge the common and common situations, optimize the construction of audit case base and method base algorithm, and deepen the application of audit results mining.

## 4. Conclusions

### 4.1. Value Proposition

Although there is a great number of accounting vouchers in the audit process, which is easy to be damaged and lost, as some professor said [11], and the enterprise management is difficult to know the internal financial situation of the enterprise in a timely manner, the project will provide an audit optimization platform for the above enterprises to fundamentally solve their needs and trace the pain points of the industry.

This project is dedicated to providing audit optimization services for accounting firms and enterprises. Help Enterprises and firms to optimize audit from the source, it solves the problems in the process of audit that have been mentioned by some scholars [12], such as the loss of accounting documents, the complexity of the process of the traditional paper documents reimbursement audit [13], the difficulty for the management to know the internal financial status of the enterprise in time, and the low efficiency [14]. The application of block chain in the platform ensures the security and authenticity of the extracted data in the process of audit, and the data on the chain is not easy to be tampered with, so as to improve the authenticity of the audit voucher information.

### 4.2. Future Work

In short, the project is going to create an efficient audit optimization platform, in order to replace the traditional mode carried out nowadays. The audit process provides customers with more convenient, easier, more accurate, the most secure data services. As mentioned before, bridging technology is committed to R & D accounting firms and inter-firm audit work of third-party data platform, to provide customers with more convenient, more accurate, more simple, the most secure data services. The customer uploads the business certificate through the

image, the uploading success namely the automatic scanning conversion text data, replaces the traditional manual input data pattern, as the professor depicted in the paper [15], through the computer technology, at the same time, the platform will continue to focus on the platform's data security system development and upgrading, for the certificate security to provide double protection is very tedious [16], time-consuming, and labor costs are high, which requires guidance and operation of audit and accounting related professionals. In contrast, through our platform, AI can directly audit instead of manual work. Auditors can directly review and read the audited unit's accounting vouchers and other data stored electronically. Enterprises can upload business vouchers that occurred on the day in real time on the platform, thereby greatly simplifying the audit business process and creating higher benefits for customers.

For accounting firms, the main business of our project is to provide paper vouchers data, tracking accounting business processes [16], AI audit business, from which to gain points of profit. Provide customers with the use of system data for their audit business to provide visual accounting vouchers and paper journals and ledgers [17]. For Enterprises, we provide flexible and diverse reports instead of regular reports, sharing platform also facilitate management to view accounting documents and audit reports at any time. In a word, efficient service is our aim and goal.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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