

# Research on the Application of Machine Learning in Smart Finance

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**Abstract.** The promotion of machine learning and the depth of financial digital transformation have laid the foundation for the development of intelligent finance. Traditional machine learning methods such as logistic regression can be applied to statistical analysis of data, image recognition, and natural language processing for assisting in information acquisition. Unsupervised deep learning technology assists in the classification of information, and reinforcement learning methods can be applied to data review. In the future, the deep integration of machine learning and financial business will promote the development of intelligent finance toward refinement and efficiency.

**Keywords.** machine learning, smart finance, financial sharing center

## 1 Introduction

At present, the performance of computer hardware resources and big data analysis technology has been greatly improved. People began to use the acquired data, large-scale data analysis to improve the level of intelligence. The emergence of various types of machine learning algorithms, and the application of intelligent technology in various fields. AI (artificial intelligence) has entered into the era of machine learning. AI, as a representative scientific and technological innovation in the current era, has become the core driving force of industrial change, and has profoundly affected the development of economic and military as well as social life in various fields. Artificial intelligence has penetrated into all kinds of fields, and is deeply integrated with all kinds of industrial activities, promoting an all-round change in the field [1].

### 1.1. Accelerated development of financial digital transformation

Driven by information technology and Internet applications, the digital transformation of finance has accelerated. In the process of digital transformation, enterprises and institutions have achieved business process reengineering through the standardization and automation of business processes. Various information systems applied by enterprises, such as ERP, financial shared service centers, customer management systems, etc., provide a platform basis and data basis for the digital transformation of enterprises, and also provide support for the expansion of financial functions. Various types of business and financial data are gathered to the financial shared service center through the network. Under the continuous operation of the financial shared center, the data collection and processing capabilities are continuously

enhanced to provide strong support for business activities. The key to the digital transformation of finance lies in the utilization of digital resources and the improvement of digital management strategies. By using of data to achieve business transformation and organizational transformation, it can improve operational efficiency, and at the same time achieve business integration and assist management decision-making.

## **1.2. Digital transformation lays the foundation for intelligent applications**

The current stage of AI can not think like a human being, and people mainly use data-driven machine learning methods. The data resources and methods accumulated by financial digital transformation provide a foundation for data-driven goals. The financial digital transformation contains three features: connection, data and intelligence. The first is connection, which organically combines employees, production equipment and customers through various types of systems to generate extensive connection; the second is data, which generates data value through mining of data generated through connection, thus accumulating and generating the enterprise's digital capabilities; and the third is intelligence, which applies data-driven intelligence to various types of terminals in the enterprise to obtain value-added through intelligent operation. In the continuous promotion of financial digital transformation and the big intelligence, mobile and cloud technology, the concept of intelligent finance into people's vision. *Liu* [2] believes that intelligent finance refers to the reconstruction, expansion, etc. of traditional financial work with the help of the development of big data, AI and other technologies to build a new financial management model. Intelligent finance, as a deep stage of financial transformation, relies on the results of early financial transformation and the development of machine learning technology.

## **2 Problems with Traditional Financial Sharing Centers**

Financial shared service center is a centralized financial management model applied with the help of information technology, which can give full play to the economies of scale and is very effective for large enterprises and institutions. Shared service center will be scattered around the original financial institutions together to reduce institutional hierarchy, centralized use of financial personnel, the average distribution of the number of vouchers processing, can effectively reduce operating costs. At the same time, the standardized processing flow and relatively centralized audit staff are also conducive to improving the accounting capacity and the quality of accounting statements, improving the level of financial management to a certain extent, enhancing the internal control capacity, and reducing the financial risks faced by enterprises. The financial sharing center has improved the standardization level of finance, but it has not solved the difficulties and blockages in the traditional settlement and reimbursement business, and a large number of personnel are still carrying out low-level and repetitive business operations, and human factors affecting the auditing standards are still present, and the level and hierarchy of financial management need to be further improved.

### **2.1. Inefficient reimbursement**

The settlement and reimbursement process involves the collection of original documents, filling in reimbursement documents, financial audit and leadership review and signing, etc. The traditional reimbursement process is manually operated and time-consuming. Business

personnel first need to obtain the original reimbursement documents from external procurement and other system platforms, as well as internal management systems of various types, requiring screenshots, printing, mailing and other processes [3]. Reimbursement personnel will be the original documents after the collection of information, imported or scanned to the financial sharing platform, manually enter the reimbursement documents, you need to obtain the information one by one, entry, efficiency is not high, and the probability of error is also large. Financial document audit to manual operations The audit of financial documents is mainly conducted manually, and the audit is conducted pen by pen, and if necessary, it is necessary to consult the specifications. At the same time, it takes a certain amount of time for the leadership to scrutinize and sign the documents. Overall, the settlement and reimbursement process involves many links and is time-consuming. Although the financial sharing platform is used, it is mainly driven by manual operation and the overall efficiency is not high.

## **2.2. Lack of harmonization of review criteria**

At the front-end stage of obtaining original documents, there are hidden dangers. Reimbursement personnel are not necessarily familiar with reimbursement operations, and the original documents they fill out or obtain may be incorrect, and the attachments they provide may not meet financial requirements. In the auditing stage, it mainly relies on manual operation, which requires high business quality of financial personnel [4], who should be familiar with all kinds of standards and specifications, as well as a strong sense of responsibility and a certain degree of experience. If the audit fails, it needs to be fed back to the reimbursement personnel. Because of the existence of understanding errors [5], there may be multiple returns. The financial sharing platform manages audits mainly in a manual way and is operated by many people at the same time, which can cause compliance and integrity checks to be affected by human factors, insufficient business control capabilities, and a reduction in internal control capabilities.

## **2.3. Low level of financial management**

In the financial sharing platform, financial personnel still focus their main work on some basic and repetitive auditing and accounting work, and are unable to focus their energy on high value-added work. For example, financial personnel carry out manual auditing of documents in settlement reimbursement, and repeatedly explain the auditing results to reimbursement personnel; the accounting process also requires the participation of financial personnel in confirming the information of accounts and other information. The financial personnel need to spend a lot of time to organize various kinds of basic data of the system and make simple financial statements [6]. The statistical summarization of various information systems requires manual checking and statistics, which not only has a high error rate, but also has a low processing efficiency. Finance personnel spend a lot of time on simple and inefficient checking and statistical work, and have no time to pay attention to the internal control system, financial risk early warning, so as to low level of financial management decision-making [7]. They even have less energy to participate in high-value work, such as assisting in business decision-making, strategic management and so on.

### **3 Application of Machine Learning Algorithms in Financial Operations**

Machine learning is the core of current AI technology, including traditional machine learning algorithms such as logistic regression, bayesian algorithm, random forest, support vector machine, etc. supervised and unsupervised deep learning algorithms and reinforcement learning are also main methods in Machine learning, which is typically represented by deep learning algorithms using neural networks. The development of financial business is closely related to information technology. Financial business is also a typical application area of machine learning. Intelligent finance can use mature machine learning products, such as invoice recognition using image recognition technology. It also directly apply machine learning algorithms themselves to financial management activities, train machine models and form specific algorithms with the support of a large amount of data [8], so as to discover the laws of economic activities, predict the next step, and provide guidance for financial supervision, business decision-making and so on.

#### **3.1. Traditional machine learning methods**

Traditional machine learning methods including regression analysis, decision trees, plain Bayesian algorithms, support vector machines, etc., are easy to understand and suitable for both structured and unstructured data. However, these methods have high requirements for data analysts, who must understand the business knowledge of the relevant domain and have rich experience and certain model knowledge. They need to manually select the model and extract the model features [9], which leads to the traditional machine learning is only applicable to a small and slightly simpler set of data. However, traditional machine learning methods appeared earlier and developed maturely, and are widely used in the financial field, for example,

- Automatic accounting. It uses algorithms similar to decision trees to complete automatic bookkeeping by categorizing and summarizing existing types of settlement operations. It sets decision conditions at multiple levels, to classify operations and determine accounting types, subjects, and other content.
- Funding trend prediction. It can use models such as logistic regression and support vector machine to analyze historical data, match similar linear regression models or high-dimensional models, and realize the prediction of future fund operation.

#### **3.2. Supervised learning**

Traditional machine learning methods are more effective for analyzing data with fixed rules. But for situations of high complexity, the fit is poor, and then deep learning algorithms can be used. Deep learning algorithms are closer to the scope of human intelligence, which draws on the results of neurology and cognitive science. They use a large neural network for analysis, through the network connection and weighting to determine the results of the decision, which is similar to the human nervous system. Neural networks are more effective for large-scale data analysis, suitable for obtaining information features from complex data, and it has achieved remarkable results in many fields such as image recognition, natural language processing, personalized recommendation and so on. Depending on whether the training data

is labeled or not, deep learning can be distinguished into supervised and unsupervised approaches [10].

Supervised learning refers to labeling the data in deep learning, and the machine analyzes and generalizes this collated data to uncover common features of the same type of data. For example, if a machine model is provided with a large number of images of VAT invoices, the machine can discover the characteristics of the VAT invoices, find the invoices from other documents, and recognize the key information in the invoices. Supervised learning is a more mature approach to deep learning and has produced a large number of practical products [11], for example,

- image recognition algorithms. Use image recognition algorithms to automatically identify reimbursement information in various types of bills, simplifying settlement and reimbursement procedures and providing efficiency in reporting accounts.
- Text classification algorithms. Use text classification algorithms to obtain information about public sentiment from publicly available data sources to predict stock trends and provide assistance in financial activities.
- Automatically identify financial risks of companies using analysis of the economic situation, risk ratings of companies, financial statement analysis, and historical risk characteristics.

### **3.3. Unsupervised learning**

Unsupervised learning is the opposite of supervised learning in that it does not require guidance in the learning process and uses unlabeled data. During the training process, the model automatically looks for similarities and differences between various types of data, classifies the data, and generalizes the implicit relationships between the data. For example, a large number of unlabeled images of bills and non-bills are provided to the machine model, and then the machine classifies the data with similar features into different groups to achieve the recognition of bills. Unsupervised learning is mainly used for clustering analysis, relative to supervised learning, it uses less resources, but the application effect is a little worse, generally can be used in combination with supervised learning and unsupervised learning to comprehensively utilize the advantages of the two types of algorithms. For example, the user personalized recommendation system, in the initial stage of business, and there is no defined grouping, you can use clustering methods and unsupervised learning methods to identify different categories, and take different suggestions and recommended content for different categories. When there is enough data, unsupervised learning methods can also be used in the first step of analysis to narrow down the scope of the algorithm's search.

### **3.4. Reinforcement learning**

Reinforcement learning is similar to deep learning in that it is an autonomous learning algorithm. They use different training strategies, deep learning trains on a dataset, acquires knowledge, and can apply that knowledge to new data. Reinforcement learning is a dynamic learning method that provides continuous feedback on actions taken with the goal of maximizing returns. Specifically, Reinforcement Learning provides "rewarding" and

"punishing" feedback on decisions made by the machine over and over again, and guides the machine towards the goal by setting up a decision algorithm.

In addition to optimizing its own algorithms, Reinforcement Learning can be used to guide algorithms towards specific goals and achieve better decision-making based on the developer's requirements. Using a combination of reinforcement learning and deep learning along with historical data and rules of thumb, better predictive algorithms can be designed. For example, the intelligent audit function used in settlement reimbursement can use historical audit data to train the model, and at the same time, use the existing rules to guide the model training to achieve accurate determination of reimbursement document compliance.

#### **4 Summary and outlook**

Currently, the application scenarios of machine learning in the field of intelligent finance include the following aspects:

- applying traditional machine learning methods such as logistic regression and decision tree to perform statistical analysis of data and realize trend prediction.
- using image recognition and natural language processing technology to assist in obtaining information and improve the efficiency of entry.
- using unsupervised deep learning technology to classify information and make personalized recommendations on the classification results to enhance the information processing capability.
- combining reinforcement learning methods for data auditing to improve supervision. Among them, traditional machine learning methods and supervised deep learning algorithms are more mature in technology, have a wide range of applications and achieve better results.

The further expansion of financial intelligence applications depends on further breakthroughs in technology. Although machine learning has achieved great success, its own shortcomings lead to a surge in application costs or potential risks.

- Training machine learning models requires a large amount of labeled data, while consuming a large amount of computational resources and time, so the costs are larger. At the same time, machine models can only recognize data that has been "seen before" and need to be re-trained for new types, which also significantly increases the cost.
- Complex machine learning algorithms are generally "black box" models, i.e.. They cannot be accurately interpreted using standardized mathematical principles or people's perceptions, which leads to their correctness being questioned.
- Machine learning can be effectively applied to scenarios with fixed rules or low complexity. But the effect of machine learning is still limited because economic activities involve many factors that humans cannot accurately predict.

In the future, with the changes and breakthroughs in AI technology, machine learning and financial business will be further integrated in depth. With the help of financial experts and intelligent technology, it can participate in the complex financial activities of the enterprise, production and operation activities for analyzing and judging, and provide decision-making recommendations [12]. Intelligent finance will continue to transform and expand the traditional financial business, and promote the development of financial business in the direction of refinement and efficiency.

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