

# *The Application of Artificial Intelligence in Enterprise Auditing*

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**Keywords:** Artificial Intelligence, Enterprise Audit, Application

**Abstract:** In recent years, the scope of audit is more and more extensive. The audit business is more and more, and the environment of the auditee is more and more complex. In the big data environment, the data volume of auditees is growing rapidly. All these require auditors to complete more work in a shorter period of time and better complete the audit objectives. The application of artificial intelligence and other technologies can shorten the time of audit data collection and analysis and reduce simple and repetitive labor. It allows the software to learn the audit mindset on its own, so that auditors can devote more energy to solving key problems. At the same time, the artificial intelligence also brings opportunities and challenges to audit work. How to seek advantages and avoid disadvantages is the current artificial intelligence audit needs to be solved.

## 1. Introduction

### 1.1 Artificial Intelligent

Artificial intelligence (AI) is a theory, method, technology and application system that uses digital computers or machines controlled by digital computers to simulate, extend and expand human intelligence, perceive the environment, acquire knowledge and use knowledge to obtain the best results [1]. The artificial intelligence system can solve the data by self-reasoning through the pre-input learning mode. Bayesian formula commonly used in artificial intelligence:

$$P(A/B)=P(B/A)*P(A)/P(B) \quad (1)$$

### 1.2 Artificial Intelligence Audit

Artificial intelligence audit is a new audit operation mode produced in the era of big data, which can encapsulate image recognition, language recognition, structured data acquisition, unstructured data acquisition, information system audit rules and data audit rules into intelligent robots or software systems. To achieve a high degree of automation of audit data collection, data platform construction, data analysis, report writing and extended forensics, thereby improving the efficiency of auditing work.

### 1.3 The Relationship between Big Data, Cloud Computing and Artificial Intelligence

There is a close relationship between big data, cloud computing and artificial intelligence technologies, which is shown in the figure 1.

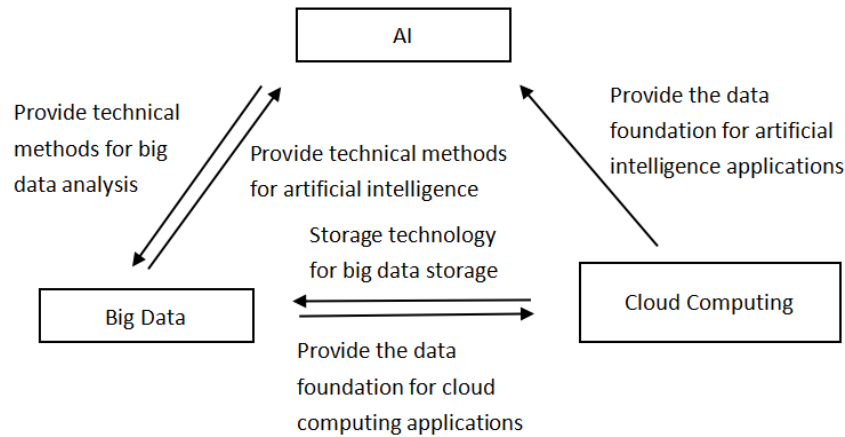


Figure 1: The Relationship between Big data, Cloud computing and Artificial intelligence in Intelligent Auditing

In the big data environment, audit big data provides the data source basis for applying artificial intelligence technology to carry out big data intelligent analysis. Related technologies of cloud computing provide the implementation method for auditing big data storage, and provide the computing power basis for auditing data analysis and calculation in big data intelligent analysis.

## 2. Application of Artificial Intelligence Technology in Audit

### 2.1 The Main Technology of Artificial Intelligence

#### 2.1.1 Machine Learning

Machine learning is the most important artificial intelligence implementation method at present, and its advantage is that it can run fast and process massive data in a short time. Deep learning is a more advanced stage of machine learning, in which humans input data to machines, and adjust and train the strong and weak connections between neurons through the simulation of human brain and human neural network to achieve learning [2].

#### 2.1.2 Machine Interactive Sensing

Through optical character recognition (OCR), speech recognition, image recognition and other technologies, artificial intelligence can sense the external environment through vision and hearing like humans.

#### 2.1.3 Knowledge Graph

By structuring the text information and describing the concepts and relations between different information in the form of symbols, a knowledge relationship network is formed, which is convenient for artificial intelligence to retrieve at any time and provide a basis for further decision-making.

## 2.1.4 Natural Language Processing (NLP)

This paper uses human-understandable language to interact through semantic understanding, machine translation, question answering system, human-computer interaction perception and recognition of the external environment, and the results of machine learning.

## 2.1.5 Robotic Process Automation (RPA)

RPA is based on pre-set business processing rules, simulate and enhance the interaction process between users and computer systems, automatically complete a series of specific workflow and expected tasks, and effectively realize the intelligent software of human, business and information systems. RPA needs to rely on fixed rules and instructions to complete automated tasks, which is characterized by a large number of repetition and clear rules [3].

Table 1: The application of artificial intelligence technology in auditing

Technical Name	Scope of application	Application in auditing
Robotic process automation (RPA)	Rule-based process automation	Internal audit data collection Automated testing Automated Document Review Automated manuscript preparation Internal audit project management, etc
Automatic speech recognition (ASR)	Convert speech data to text data	Audit data transcription analysis Identify audit risks
Optical character recognition (OCR)	Convert images to editable text	Audit data transcription analysis Contract information extraction
Web crawler	Simulate manual clicking according to certain rules	Massive audit data collection Conduct a comprehensive analysis and review of customer data Conduct consistency testing
Natural language processing (NLP)	Realize effective communication between human and computer with natural language, so that computer has the ability to process human language	Intelligent extraction of audit data Automatic identification of risk points Text sentiment analysis
Knowledge Graph	Extract and transform data from massive unstructured data, efficiently and intuitively depict the intricate relationship network of the subject, and reproduce the real situation of the subject in three dimensions	Monitoring internal controls Comprehensive investigation of audit data Assist in audit decision-making
Sophisticated Data Analysis	Integrate powerful data processing tools to collect, integrate and analyze complex data in a high-performance data processing way, and quickly mine effective information	Exploring the Deep Value of Audit Data Assist in audit analysis Evaluate ongoing operations

In the era of artificial intelligence, the collection scope of audit data is no longer limited to the available structured data and unstructured data, and intelligent robots or software systems can process and collect a wider range of data through their unique language recognition systems and image recognition systems, including image data, video data, audio data, structured data and other types of unstructured data [4], is shown in Table 1.

## 2.2 Application of Artificial Intelligence in Specific Audit Procedures

### 2.2.1 Inspection

When checking the paper materials of the audited entity, optical character recognition and

targeted recognition technology can be used to find the position of the text in the paper document through image preprocessing and text detection. The text in the paper document can be converted into black and white dot matrix images through text recognition, and further converted into text format. The fields in the text can be extracted through text extraction, and the extracted results can be finally output. Realize the automatic collection of all kinds of paper materials and original vouchers, account books, etc. While recognizing and grasping paper texts, it synchronously realizes electronic data conversion and intelligent cataloging, and synchronously generates digitized audit evidence and working papers.

### **2.2.2 Observation**

When observing the site and key operation process of the audited entity, intelligent tracking and shooting technology can be used to achieve no-blind coverage of the panoramic scene beyond the visual range and wide field of vision, global search and automatic capture, and the key operation process of the audit object can easily be presented in a clear and unmanned way. Through the collection and correlation analysis of big data, we can find some audit clues that cannot be captured manually.

### **2.2.3 Enquiry**

When asking the auditee about the situation, the traditional audit must send two auditors to participate in the on-site inquiry and record, with the help of artificial intelligence phonetic conversion technology and voice recognition function, the machine learning proprietary vocabulary database is first implemented in the pre-trial investigation stage, and then direct conversion of phonetic characters into text records, so as to realize the synchronization of the situation description of the questioned object and the transcript of the audit working paper. The accuracy of the system record is greatly improved, so as to achieve a revolutionary change from manual typing records to intelligent identification, greatly releasing human resources, and even launching online inquiries to achieve off-site auditing.

### **2.2.4 Confirmation**

Bank letters and confirmation letters to debtors are one of the core procedures for obtaining audit evidence, which is essential for identifying errors and fraud in financial statements. However, due to fraud in the printing, exchange and preservation process, traditional paper letters sometimes fail the audit. The implementation of electronic certification is of great significance for facilitating the collection of evidence by both parties, ensuring the quality of information in the reply letter, preventing operational risks and maintaining market order. The electronic confirmation platform built with block chain technology has the characteristics of immutable, multi-party mutual trust, safety and reliability, and has incomparable advantages for the transmission and confirmation of confirmation information, effectively improving the efficiency of confirmation, reducing the cost of confirmation, shortening the time of confirmation, and avoiding the risk of confirmation.

### **2.2.5 Recalculation**

Algorithm is the basis and soul of recalculation, using binary search, block search, hash search for data search and resource allocation. The similarity algorithm can be used to analyze the similarity and semantic relevance of the text, and then filter the duplicate information. By using decision tree, Bayesian network, neural network and genetic algorithm to extract the features of the training data samples, the data classification conforming to the specific features is finally formed.

The generic clustering of clustering data samples is realized through systematic clustering and fuzzy clustering. By using probability models such as maximum likelihood estimation, linear regression and least square method to learn the historical data, it can get the correlation among the data, and predict the future data. Using decision tree and random forest to generate multiple classifiers, learn and make decisions independently, and finally realize machine learning and making decisions. The association rule algorithm such as Apriori is used to mine the possible relationships between data from massive historical data, forming the ability from big data to knowledge and from knowledge to making decisions.

### **2.2.6 Re-execution**

The most of enterprises have three business cycles: collection, payment, production and inventory [5]. RPA can continuously track, evaluate and feedback a large number of complicated processes and internal control nodes, guide and straighten out the interaction of various actions, constantly correct and optimize the direction, and truly achieve full coverage of audit of all business nodes, which is difficult to achieve in the manual mode.

### **2.2.7 Analytical Procedures**

The application of artificial intelligence technology can carry out intelligent verification of audit evidence obtained from different sources, confirm the degree of cross-examination and occlusion between materials, and send hints and early warnings to auditors where there are contradictions, so as to prevent the audit from "wrong starting point, wrong following, wrong to the end".

## **3. The Impact of Artificial Intelligence on Auditing**

### **3.1 The Positive Role of Artificial Intelligence in Audit Applications**

#### **3.1.1 Improve Audit Efficiency and Reduce Audit Costs**

Artificial intelligence can simplify the data confirmation process through computer programming, help auditors analyze a large amount of financial data at the overall level of financial statements, and automate the data conversion, sorting, calculation and analysis processes in the auditing process.

The expert analysis system of artificial intelligence technology can verify financial data and information, compare and analyze financial statements of previous years, ensure the accuracy of financial information, comprehensively improve the efficiency of corporate financial audit, and thus reduce the cost of corporate audit.

#### **3.1.2 Expand the Scope of Audit and Prevent Audit Risks**

The effective application of artificial intelligence technology has gradually transformed the traditional sampling audit into the overall audit, breaking the limitations of traditional audit work. In the process of data analysis and acquisition, artificial intelligence technology will not be affected by the environment and technology, and can conduct a comprehensive audit of comprehensive information. Artificial intelligence technology can extract the required data from massive data, conduct comprehensive evaluation of the data content, timely discover the main factors affecting the audit results, clarify the source of audit risks, and reduce audit risks by expanding the scope of audit. Avoid the numerical errors that exist in the traditional auditing process.

### 3.1.3 Simplify Audit Process and Share Information in Real Time

Auditors can directly obtain analysis results, data characteristics of audited units, the structural differences of different data sets from the artificial intelligence audit system, and use their own experience to draw audit conclusions [6]. Through network communication, data information can be stored in the database of the unified information platform. It can improve the integrity and accuracy of audit information storage, realize real-time information sharing, and improve the quality of enterprise financial audit, is shown in Table 2.

Table 2: The advantages of applying artificial intelligence technology in auditing

Technical Name	Advantage
Robotic process automation (RPA)	Repetitive task automation Improve audit efficiency Auditors can focus on other value-added tasks
Automatic speech recognition (ASR)	Improve audit coverage Reduce labor costs Enhance customer experience
Optical character recognition (OCR)	Improve audit coverage Reduce labor costs Enhance customer experience
Web crawler	Improve audit efficiency Improve data authenticity and reliability
Natural language processing (NLP)	Improve insight into Data Improve audit quality
Knowledge Gragh	Reduce audit risks Assist in ongoing audits Preventing fraudulent behavior
Sophisticated Data Analysis	Improve audit efficiency Enhance predictive analysis capabilities

## 3.2 The Negative Role of Artificial Intelligence in Audit Applications

### 3.2.1 Technical Risks Increase, Information Security Risks High

With the advancement of technology, the scope of application of automation in audit business is constantly expanding [7]. When using artificial intelligence technology to analyze data, technical risk has a wider penetration. The existing technical conditions for the analysis and processing of structured data has been intelligent and accurate, but most of the unstructured data presented in the form of pictures, videos, emails, etc., are difficult to be directly used for analysis and processing. Due to the inability to fully control such data, it is easy to appear a large number of "pseudo-correlation" relationships, and even wrong inferences and conclusions may occur. On the other hand, although AI can share it with other users via the Internet, it cannot fully guarantee the security of the information.

### 3.2.2 Lack of Communication Ability with People, Easy to Ignore the Value of People

At present, artificial intelligence is widely used in the data collection, storage, processing, analysis and other aspects of modern risk-oriented audit. Through the use of advanced algorithms and data processing capabilities, the instructions issued by auditors can be accurately executed. However, artificial intelligence is only a tool used in audit work. It is not a substitute for adequate and effective communication between auditors and auditees to make decisions, so audit subjects can not only rely on the analysis results of artificial intelligence to make judgments. In different audit

environments, auditors make a comprehensive assessment of the audited entity through auditing techniques and experience, so as to formulate a feasible audit plan. For some important audit areas and audit matters, it is necessary to make the final judgment through their own experience and professional knowledge.

### 3.2.3 The Audit Risk is More Hidden and the Audit Responsibility is Difficult to Define

Artificial intelligence has developed from the original traditional models such as regression algorithms and decision trees to today's emerging algorithms such as deep learning, and its calculation and decision making process is becoming more and more complex [8]. Except for those who develop and design algorithms, others cannot understand the algorithm model and its operating mechanism, let alone understand and judge its internal mechanism. Especially in the case of decision-making errors, it is difficult to judge whether it is subjective caused by auditors or caused by network technology or algorithm model, so it is difficult to investigate specific responsibilities when determining [9], is shown in Table 3.

Table 3: The risks of applying artificial intelligence technology in auditing

Technical Name	Risks
Robotic process automation (RPA)	Network security risks Easy to overlook the cultivation of basic abilities of auditors
Automatic speech recognition (ASR)	Data privacy breach Speech and text style features interfere with information recognition and conversion
Optical character recognition (OCR)	Data privacy breach Speech and text style features interfere with information recognition and conversion
Web crawler	Difficulty in distinguishing high-quality data Risk of infringement of data property rights
Natural language processing (NLP)	May propagate or amplify perceived biases learned from auditor's target data
Knowledge Gragh	Network security risk Cannot completely replace audit professional judgment
Sophistcated Data Analysis	Network security risk Cannot completely replace audit professional judgment

## 4. Measures to Promote the Effective Use of Artificial Intelligence in Auditing

### 4.1 Improve the Intelligent Level of Auditing, and Improve the Learning, Communication and Observation Ability of Artificial Intelligence

Through the research of new algorithms, enterprises gradually deepen the application of deep learning, such as deep reinforcement learning, adversarial generation network, deep forest map network, transfer learning, to further improve the efficiency and accuracy of artificial intelligence deep learning [10].

Since deep learning has high requirements for the computing power of artificial intelligence, enterprises can develop specialized computing frameworks and platforms to improve the deep learning capability of artificial intelligence, so that artificial intelligence can complete more complex and accurate audit tasks. This can reduce the work pressure of auditors and improve the accuracy of audits.

## 4.2 Establish Information Data Protection System to Improve Information Security

A good job of network security protection can avoid attacks by Trojans and viruses, and prevent data damage caused by malicious tampering. Therefore, it is necessary to strengthen the security protection of financial intelligent audit system. Auditors should explore a number of system functions of artificial intelligence technology in combination with the work needs of enterprise financial audit, and make technical breakthroughs in enterprise financial management.

## 4.3 Attach Importance to the Training of Intelligent Financial Audit Talents

Auditors not only need to have a solid financial audit function, but also need to be skilled in artificial intelligence technology operation, and even develop artificial intelligence systems. Enterprises should actively introduce high-quality composite application talents, and strengthen the effective integration between artificial intelligence and financial auditing work. Enterprises should carry out professional training for corporate financial auditors, and urge auditors to learn more comprehensive financial audit knowledge and artificial intelligence application skills.

## 5. Conclusions

Artificial intelligence technology can simplify the audit process, improve the audit efficiency and reduce the audit cost. On the other hand, artificial intelligence technology will increase the risk of information security and the difficulty of defining audit responsibility. These problems can be solved by improving the intelligent level of audit, establishing information data protection system, improving information security and so on.

## Acknowledgments

This work was supported by "Research on the Construction of Mixed Curriculum of Auditing in Private Colleges under the Background of New Liberal Arts" (Sichuan Private Education Association, MBXH22YB51).

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