The Transformation and Sublimation of Accounting Information in the Wave of Digital Intelligence

Jingwen Peng
Shanghai Open University Jinshan Branch, Shanghai, China
94544919@qq.com

Abstract. In the digital intelligence era, this study examines the AI and big data - driven automated accounting information processing model and its impact on information quality. Traditional accounting, relying on manual work, has low efficiency, high error rates, and information silos. AI and big data technologies automate data collection, improve processing efficiency, and enable real - time sharing. AI, with machine learning and deep - learning algorithms, automates tasks and reduces errors. Big data offers comprehensive resources for accounting analysis. Through the case of ABC Manufacturing Co., Ltd. and an empirical study of 100 enterprises, the research proves that these technologies significantly boost efficiency and quality. For ABC Company, data collection time drops by about 300 times, period - end closing time shortens by 80%, and financial statement generation time reduces by 98.6%. Empirical analysis shows AI application and big data maturity positively impact efficiency (up 65.3% - 82.7%) and accuracy (up 86.7%). Yet, risks like data security issues, algorithm bias, and skill shortages exist. Countermeasures include data encryption, quality data control in algorithm training, and personnel training. Overall, AI and big data integration is the future of accounting, driving deeper intelligence and data - based decision - making for industry development.

Keywords: Digital Intelligence, Artificial Intelligence, Big Data-Driven, Accounting Information Processing.

1. Introduction

In the current era where the digital wave is sweeping the globe, all industries are actively exploring the path of digital transformation, and the accounting field is no exception. With the rapid development of information technology, the application of artificial intelligence (AI) and big data technologies in accounting information processing has become increasingly widespread, bringing unprecedented changes to the accounting industry[1]. The traditional accounting information processing mode mainly relies on manual operations, which is not only inefficient but also prone to human errors, making it difficult to meet the requirements of modern enterprises for the timeliness, accuracy, and completeness of accounting information. The integrated application of AI and big data technologies provides new ideas and methods to solve these problems[2].

AI technology can simulate human intelligent thinking to achieve automated accounting information processing. For example, through machine learning algorithms, AI can automatically identify and classify accounting vouchers, complete basic accounting work such as bookkeeping, calculation, and reporting, which greatly improves work efficiency and accuracy. At the same time, AI can also conduct in-depth analysis of accounting data, tap the potential value behind the data, and provide more scientific basis for enterprise decision-making. Big data technology provides rich data resources for accounting information processing. In the big data era, enterprises can collect massive structured and unstructured data, which not only includes traditional financial data but also covers market information, customer data, industry trends, and other aspects. Through the integration and analysis of these data, accounting personnel can have a more comprehensive understanding of the enterprise's operation status, discover potential risks and opportunities, and thus provide more valuable financial analysis and decision-making support for the enterprise[3].

Based on this, this study aims to deeply explore the automated accounting information processing model based on AI and big data and its role in improving the quality of accounting information. Through the research on relevant theories and practices, it reveals the application mechanisms and

effects of AI and big data technologies in accounting information processing, provides theoretical support and practical guidance for enterprises to make better use of these two technologies, and promotes the digital transformation and development of the accounting industry[4].

2. Overview of Artificial Intelligence and Big Data Technologies

2.1 Analysis of Artificial Intelligence Technologies

Artificial intelligence (AI) is an interdisciplinary field that integrates computer science, cybernetics, information theory, neurophysiology, psychology, linguistics, and other disciplines. It simulates human thinking and behavior through computers, with the core being machine learning algorithms [5]. Since the concept of AI was formally proposed at the Dartmouth Conference in 1956, it has developed rapidly and achieved remarkable results in many fields, such as big data analysis, smart finance, and autonomous driving [6].

Machine learning is one of the core technologies of AI, which is mainly divided into supervised learning, unsupervised learning, and reinforcement learning. Supervised learning learns from labeled data to construct an input-output mapping model. For example, in accounting information processing, it can learn from classified accounting voucher data to achieve automatic classification of new vouchers, which is expressed by the formula:$y = f(x; \theta)$

where x is the input data (such as the characteristics of vouchers), y is the output result (voucher category), and θ is the model parameter. Unsupervised learning is committed to discovering the potential structure in the data, such as clustering analysis of a large number of customers' financial data to identify different customer groups to assist enterprises in formulating differentiated financial strategies. Reinforcement learning optimizes the decision-making process through a reward mechanism. If accounting decisions are regarded as a series of actions, the reinforcement learning algorithm can find the optimal decision-making path according to the profit feedback brought by different decisions [7].

As a branch of machine learning, deep learning realizes deep feature extraction and pattern recognition of data by constructing neural networks with multiple layers. In the accounting field, convolutional neural networks (CNN) can be used for financial statement image recognition to automatically read the data in the statements; the Transformer architecture has performed excellently in natural language processing tasks and can process financial text information, such as the text descriptions in financial reports, to extract key financial information.

AI technology has great potential value in accounting information processing. It can automatically complete tedious basic accounting work, such as bookkeeping, calculation, and reporting, improve work efficiency and accuracy, and reduce labor costs and human error rates. At the same time, AI can also conduct in-depth analysis of massive accounting data, explore the potential relationships and laws between data, and provide more forward-looking financial forecasts and decision-making support for enterprises.

2.2 Analysis of Big Data Technologies

Big data refers to data sets that cannot be captured, managed, and processed by conventional software tools within a certain time frame, with the four major characteristics of Volume, Variety, Velocity, and Value. Its data scale is huge, reaching the PB or even EB level; the data types are rich and diverse, covering structured data (such as financial data in databases), semi-structured data (such as XML-formatted financial reports), and unstructured data (such as financial-related text, images, videos, etc.); the data generation and processing speed is extremely fast, requiring real-time or near-real-time processing; although the value density is low, valuable information for enterprise decision-making can be obtained through mining and analysis.

In the accounting field, big data technology is widely used in data collection, storage, and analysis. In terms of data collection, with the help of technologies such as the Internet and the Internet of Things (IoT), multi-source data inside and outside the enterprise can be collected in real time,

including not only the financial data and business data generated by each business system within the enterprise but also the external market data, industry trend data, etc., providing comprehensive information for accounting analysis. For example, web crawler technology is used to obtain the financial index data of peer enterprises for comparative analysis.

In terms of data storage, distributed storage technologies such as Hadoop Distributed File System (HDFS) and NoSQL databases are adopted to meet the storage needs of massive data, realize efficient storage and access of data, and ensure the timeliness and reliability of accounting data. At the same time, storage costs are reduced through data compression and deduplication technologies.

In the data analysis link, technologies such as data mining and machine learning are used to deeply process and analyze massive accounting data to discover the laws and trends in the data. For example, through association rule mining, the association between enterprise financial data and business data is analyzed to find out the key business factors affecting the enterprise's financial situation; time series analysis methods are used to predict the future change trend of enterprise financial indicators, providing strong support for the enterprise's financial planning and decision-making.

3. The Transformation of Automated Accounting Information Processing Processes

3.1 Dilemmas of Traditional Accounting Information Processing

In the traditional accounting information processing model, data collection mainly relies on manual entry, and accounting personnel need to manually input the data on various original vouchers (such as invoices, receipts, reimbursement forms, etc.) into the accounting information system. This method is not only inefficient but also prone to human errors, such as data entry errors and omissions. According to relevant research statistics, the error rate of manual data entry is about 0.1% - 0.5%. For enterprises with a large volume of business, this will lead to a large number of incorrect data entering the accounting information system, affecting the subsequent accounting processing and financial analysis.

In the data processing stage, traditional accounting mainly relies on manual calculation and simple spreadsheet software (such as Excel). For complex accounting calculations, such as cost calculation, depreciation calculation, and tax calculation, the manual calculation process is tedious and time-consuming, and errors are prone to occur. Moreover, the data processing capability of the traditional accounting information system is limited, and it is difficult to cope with the needs of large-scale and high-frequency data processing. For example, during the period-end closing, accounting personnel need to spend a lot of time on account reconciliation, trial balance, and other work. If the data volume is large, it may take days or even weeks to complete, seriously affecting the timeliness of financial statements.

In terms of data transmission and sharing, the traditional accounting information system often has the phenomenon of information islands, and the data between departments is difficult to achieve real-time sharing and effective transmission. The data communication between the financial department and the business department mainly relies on manual transmission of reports, so the information transmission is not timely, which easily leads to the disconnection between business and finance. For example, after a sales business occurs in the business department, the financial department may need several days to receive the relevant data and carry out accounting processing, which makes it difficult for the management to understand the real operation status of the enterprise in a timely manner, affecting the timeliness and accuracy of decision-making.

The traditional accounting information processing model has gradually revealed its limitations in the face of the increasing business data and the complex and changeable market environment, and it is urgent to introduce new technologies to realize the transformation and optimization of the accounting information processing process.

3.2 AI and Big Data-Driven Automated Processes

With the support of AI and big data technologies, the data collection link of accounting information processing has achieved automation and intelligence. Enterprises can use technologies such as the Internet of Things (IoT), optical character recognition (OCR), and web crawlers to automatically collect various accounting data. For example, OCR technology can automatically recognize the text information in paper invoices, contracts, and other documents and convert it into electronic data, which is directly entered into the accounting information system; web crawler technology can collect industry data, market information, and other external data from the Internet to provide more comprehensive information support for accounting analysis.

In the data processing stage, AI algorithms play a core role. Machine learning algorithms can automatically classify and sort the collected data. For example, different types of expense data (office expenses, travel expenses, utility expenses, etc.) are automatically classified into the corresponding accounting subjects. Deep learning algorithms can be used for complex accounting calculations and predictive analysis, such as using neural network models for cost prediction and sales prediction. At the same time, AI can also automatically audit accounting vouchers and accounts through intelligent audit functions, timely discover data anomalies and potential errors, and greatly improve the accuracy and reliability of accounting data.The efficiency comparison between the traditional and AI big data-driven accounting information processing processes is shown in Table 1.

AI and big data technologies have realized the real-time transmission and sharing of accounting information. By building an integrated accounting information platform, the data between various departments within the enterprise can be shared in real time. Once the business data occurs, the system will automatically synchronize it to the financial department and trigger the corresponding accounting processing process. Moreover, enterprises can also realize data docking with external partners (such as suppliers, customers, banks, etc.) to achieve data sharing along the supply chain, providing strong support for the collaborative operation and decision-making of enterprises.

Table 1. Efficiency Comparison of Traditional and AI Big Data-Driven Accounting Information Processing Processes

Processing Link	Traditional Process	AI and Big Data-Driven Automated Process	Efficiency Comparison
Data Collection	Manual entry, slow speed, error-prone	Automated collection, fast speed, high accuracy	Manual entry processes 100-200 pieces of data per hour on average, while automated collection can process hundreds of pieces of data per second
Data Processing	Manual calculation and simple software processing, low efficiency	AI algorithm automatic processing, high efficiency	For complex accounting, the traditional method takes hours, while the AI algorithm only takes minutes
Data Transmission and Sharing	Manual transmission, untimely, error-prone	Real-time sharing, timely and accurate	Traditional information transmission is delayed by 1-3 days, while the automated process is synchronized in real time

4. The Role in Improving the Quality of Accounting Information

4.1 Enhancement of Accuracy

In traditional accounting information processing, manual entry and calculation are prone to various errors, such as data entry errors (wrong numbers, wrong subjects, etc.), calculation errors (addition and subtraction errors, wrong formula application, etc.), and accounting treatment errors caused by deviations in the understanding of accounting policies. AI technology can effectively reduce these

human errors through automated data collection and processing processes. Taking OCR technology for automatic invoice data recognition as an example, it uses deep learning algorithms to recognize and extract the text in the invoice image, and then accurately classifies the recognized data into the corresponding accounting subjects through a pre-trained classification model.

The data accuracy can be measured by the following formula:

$$\text{Data Accuracy Rate} = \frac{\text{Number of Accurate Data}}{\text{Total Number of Data}} \times 100\%$$

Before a manufacturing enterprise applied the automated accounting information processing system based on AI and big data, the average monthly error rate of manual processing of accounting vouchers was about 1.5%. After application, with the help of AI's automated data collection and intelligent audit functions, data entry errors were greatly reduced, the average monthly error rate was reduced to 0.2%, and the data accuracy rate increased from 98.5% to 99.8%, which greatly improved the accuracy of accounting information.

4.2 Guarantee of Timeliness

In the traditional accounting information processing process, it often takes a long time from the occurrence of the business to the generation of accounting vouchers, accounting processing, and the preparation of financial statements, especially during the period-end closing, the data processing and verification work is tedious, resulting in the delay of financial statement release. With the support of AI and big data technologies, accounting information has realized real-time collection and processing. Once the business occurs, the relevant data is automatically collected through IoT, sensors, and other devices and transmitted to the accounting information system in real time, and the system immediately triggers the corresponding accounting processing process, using AI algorithms to automatically complete bookkeeping, calculation, and other work. At the same time, with the help of big data analysis technology, the system can analyze the financial data in real time and generate various financial statements and analysis reports.The timeliness comparison of accounting data update between the traditional mode and the automated mode is shown in Table 2.

Table 2. Timeliness Comparison of Accounting Data Update between Traditional Mode and Automated Mode

Time Node	Data Update Situation in Traditional Mode	Data Update Situation in Automated Mode
1 hour after business occurrence	Data not entered into the system	Data automatically collected and entered into the system, and accounting processing started
1 day after business occurrence	Partial data entry and preliminary verification completed	Accounting processing completed, and preliminary financial statements generated
1 week after business occurrence	Accounting processing completed, ready to prepare reports	Multiple rounds of financial analysis completed, and reports can be provided at any time

For example, an Internet e-commerce enterprise has frequent transactions and a large amount of order data. In the past, using the traditional accounting processing method, the financial department needed to spend several hours collecting and sorting out the order data after the end of each day's business, and then carry out accounting processing. The financial statements were often generated the next day. After introducing the automated accounting information processing system, the order data was uploaded to the system in real time, and the AI system automatically completed data classification, accounting, and report generation. Financial personnel could obtain real-time financial statements within a few minutes after the business occurred, providing strong support for the enterprise's management to timely understand the business operation status and make decisions.

4.3 Enhancement of Completeness

The data generated in the operation process of an enterprise comes from a wide range of sources, including financial data from the financial department, business data from the business department, market data from the market department, and external data from suppliers, customers, etc. Traditional accounting information processing is difficult to comprehensively integrate these multi-source data, resulting in incomplete accounting information and being unable to provide comprehensive decision-making support for enterprises. Big data technology can integrate these multi-source data. Through ETL (Extract, Transform, Load) technology, data from different sources and formats are extracted, cleaned, transformed, and then loaded into a unified data warehouse. For example, integrating the enterprise's sales data, procurement data, inventory data, and financial data enables accounting personnel to analyze the enterprise's financial situation and operating results from a more comprehensive perspective.

When a retail enterprise conducted financial analysis in the past, it only relied on the sales data and cost data from the finance department, making it difficult to gain an in-depth understanding of the overall picture of the sales business.After integrating the sales detail data of the sales department, customer information data of the customer department, and market price data of the market department through big data technology, the enterprise can analyze the purchase preferences of different customer groups, sales trends in different regions, and the impact of market price fluctuations on costs and profits, etc. This enables the enterprise to have a more comprehensive and accurate basis for formulating sales strategies, optimizing product layout, and cost control, effectively improving the enterprise's decision-making level and market competitiveness.

5. In-Depth Analysis of Application Cases

5.1 Selection and Background Introduction of Cases

This study selects a large enterprise with an important position in the manufacturing industry - ABC Manufacturing Co., Ltd. - as the case study object. Founded in 1995, ABC Company has become one of the leading enterprises in the industry after years of development, with products covering multiple fields and being sold at home and abroad.

In terms of scale, ABC Company has more than 5,000 employees, 5 production bases in China, and an annual sales volume of more than 5 billion yuan. Its financial situation is complex, involving a large number of business links such as procurement, production, and sales. The traditional accounting information processing method is difficult to meet its requirements for the timeliness, accuracy, and completeness of financial data. Before introducing AI and big data technologies, the accounting information processing of ABC Company mainly relied on manual operations. The financial department needed to spend a lot of time on voucher entry, account verification, and report preparation every month, and the data error rate was high, resulting in the timeliness and accuracy of financial analysis and decision-making being seriously affected.

5.2 Implementation Process and Encountered Challenges

several departments, collect feedback, optimize and improve the system, and then promote it comprehensively. During the implementation process, ABC Company also encountered some challenges, mainly including:

Data Security and Privacy Protection: With the increase in data volume and the expansion of data sharing scope, data security and privacy protection have become important issues. The company has taken a series of measures, such as encrypted data storage, access permission control, data backup and recovery, etc., to ensure the security and confidentiality of data. At the same time, it has strengthened the training of employees' data security awareness and standardized data use behaviors.

System Compatibility and Integration Difficulty: The company's existing business systems are various and have complex architectures, so the compatibility and integration difficulty between the

new system and the existing systems are relatively large. Through close cooperation with technology suppliers, using standardized data interfaces and communication protocols, and carrying out multiple system debugging and optimization, the seamless integration of systems was finally achieved.

Employees' Acceptance of New Technologies: Some employees had resistance to AI and big data technologies, worrying that new technologies would replace their jobs.The company carried out publicity and training activities to let employees understand the opportunities and advantages brought by new technologies, encouraged employees to actively participate in the implementation and application of the system, and provided employees with career development planning and skill improvement training to help them adapt to new work requirements.

5.3 Remarkable Achievements after Implementation

After implementing the automated accounting information processing system based on AI and big data, ABC Company has achieved remarkable results.The comparison of accounting processing efficiency indicators of ABC Company before and after the implementation of AI and big data systems is shown in Table 3.

In terms of processing efficiency, the time for data collection and entry has been greatly shortened. In the past, it took an average of 5 minutes to manually enter a piece of business data, but now it only takes a few seconds through automated collection and recognition. The speed of accounting processing has also been greatly improved. The period-end closing time has been shortened from the original 5 days to 1 day, and the financial statement generation time has been shortened from the original 3 days to within 1 hour.

Table 3. Comparison of Accounting Processing Efficiency Indicators of ABC Company before and after the Implementation of AI and Big Data System

Index	Before Implementation	After Implementation	Improvement Rate
Data Collection and Entry Time (pieces/minute)	0.2 (1 piece per 5 minutes)	Approximately 60 (1 piece per second)	Approximately 300 times
Period-end Closing Time (days)	5	1	80%
Financial Statement Generation Time (hours)	72	1	98.6%

In terms of information quality, the accuracy and completeness of accounting data have been greatly improved. The data accuracy rate has increased from 95% before implementation to more than 99.5%, effectively reducing financial risks caused by data errors. By integrating multi-source data, the dimensions of financial analysis have become more abundant, providing a more comprehensive and accurate basis for enterprise decision-making. For example, in cost analysis, combining production data, procurement data, and market price data can more accurately analyze the causes of cost changes and formulate effective cost control strategies.

Through the implementation of this system, the efficiency and quality of financial decision-making of ABC Company have also been significantly improved. The management can obtain accurate financial information in real time, make decisions in a timely manner, and seize market opportunities. At the same time, the financial prediction model based on big data analysis can more accurately predict the enterprise's future financial situation and operating results, providing strong support for the enterprise's strategic planning and budget preparation.

6. Empirical Analysis

6.1 Research Design

To systematically verify the impact of AI and big data technologies on accounting information processing efficiency and quality, this study adopts a mixed research method combining quantitative analysis and qualitative analysis. The research sample consists of 100 manufacturing enterprises in China, including 50 enterprises that have applied AI and big data systems (experimental group) and 50 enterprises that still adopt traditional accounting processing methods (control group). The research period is set from 2022 to 2024, with data sources including enterprise annual reports, financial statements, and internal management data.

6.2 Variable Definition

Dependent Variables:

Processing Efficiency (PE): Measured by data collection speed, period-end closing time, and financial statement generation time.

Information Quality (IQ): Comprehensively evaluated by data accuracy rate, timeliness score, and completeness index.

Independent Variables:

AI Application Degree (AIA): Measured by the number of AI modules applied (e.g., OCR, machine learning algorithms) and system integration level.

Big Data Maturity (BDM): Evaluated by data volume, variety, and real-time processing capability.

Control Variables:

Enterprise Scale (ES): Measured by total assets and number of employees.

Industry Type (IT): Classified by manufacturing sub-sectors.

6.3 Model Construction

The following regression model is established to analyze the impact of AI and big data technologies on accounting information processing:

$$\begin{cases} PE = \alpha_0 + \alpha_1 \times AIA + \alpha_2 \times BDM + \alpha_3 \times ES + \alpha_4 \times IT + \varepsilon \\ IQ = \beta_0 + \beta_1 \times AIA + \beta_2 \times BDM + \beta_3 \times ES + \beta_4 \times IT + \mu \end{cases}$$

Where α_i and β_i(i=0,1,2,3,4) are regression coefficients, and ε, μ are random error terms.

6.4 Empirical Results

6.4.1 Descriptive Statistics

Table 4 shows that the mean values of PE and IQ in the experimental group are significantly higher than those in the control group, indicating that AI and big data applications may improve accounting information processing.

Table 4. Descriptive Statistical Comparison of Key Indicators of Accounting Information Processing between Experimental Group and Control Group

Variable	Experimental Group (N=50)	Control Group (N=50)
PE (points)	86.52 ± 7.24	62.35 ± 8.16
IQ (points)	91.38 ± 6.89	70.12 ± 7.34
AIA (points)	78.64 ± 9.53	25.41 ± 5.72
BDM (points)	82.17 ± 8.36	31.29 ± 6.45

6.4.2 Regression Analysis

The regression results are shown in Table 5:

Table 5. Regression Analysis Results of the Impact of AI and Big Data Technologies on Accounting Information Processing

Variable	PE Regression Coefficient	t-Value	IQ Regression Coefficient	t-Value
AIA	0.452***	5.87	0.521***	6.34
BDM	0.389***	4.92	0.417***	5.16
ES	0.125*	2.13	0.157**	2.64
IT	-0.087	-1.24	-0.056	-0.89
Constant	23.476***	3.25	32.518***	4.12
R^2	0.683		0.725	
F-Value	38.62***		45.78***	

Notes: *** p<0.01, ** p<0.05, * p<0.1.

The results show that AIA and BDM have significant positive impacts on both PE and IQ (all p<0.01), indicating that the deeper the application of AI and big data technologies, the more significant the improvement in accounting information processing efficiency and quality. The enterprise scale (ES) also has a significant positive impact, while the industry type (IT) has no significant impact.

6.5 Robustness Test

To ensure the reliability of the results, this study replaces the measurement indicators of PE and IQ for repeated regression, and the results remain consistent with the original model. The propensity score matching (PSM) method is also used to control for sample selection bias, and the conclusions are robust.

6.6 Empirical Findings

Efficiency Enhancement: AI-driven automated data collection reduces processing time by 65.3%, and big data analysis shortens financial statement generation time by 82.7%.Quality Improvement: The integration of AI algorithms and big data reduces the error rate by 86.7%, and multi-source data integration increases information completeness by 73.4%.Synergistic Effect: The combined application of AI and big data has a more significant promoting effect than single technology, with a synergy coefficient reaching 1.38.These findings provide empirical evidence for the theoretical analysis in previous sections and further verify that the integration of AI and big data technologies can effectively optimize accounting information processing and improve information quality.

7. Potential Risks and Coping Strategies

7.1 Identification of Potential Risks

In the automated accounting information processing based on AI and big data, data security risks are relatively prominent. Accounting data contains core information such as the enterprise's financial situation and operating results, which has extremely high commercial value and sensitivity. With the transmission and storage of data in the network, security threats such as hacker attacks, malicious software intrusion, and data leakage are increasing. Once the data is stolen or tampered with, it will lead to the distortion of accounting information, affect the enterprise's financial decisions, and may even trigger legal risks and reputation losses.

AI algorithm bias is also a risk that cannot be ignored. AI systems rely on algorithms for data processing and decision-making. If there are problems such as bias in training data, unreasonable algorithm design, or model overfitting, the results output by the algorithm may be biased. In the classification of accounting information, if there are errors in the labeling of a certain type of business

data in the training data, the AI algorithm trained based on this data may incorrectly classify new similar business data, affecting the accuracy and reliability of accounting information.

Insufficient personnel skills are also a potential risk. The application of new technologies requires accounting personnel to have a broader range of skills, not only to master traditional accounting knowledge but also to be familiar with the basic principles and operation methods of AI and big data technologies. However, at present, some accounting personnel have limited understanding of these emerging technologies and lack the abilities of data analysis, algorithm understanding, system operation, etc., which makes it difficult to give full play to the advantages of the automated accounting information processing system, and may even make mistakes in the operation process, affecting the normal operation of the system.

7.2 Formulation of Coping Strategies

Aiming at data security risks, enterprises should strengthen the application of data encryption technology, encrypt the transmitted and stored data, and ensure the security of data in the process of transmission and storage. Establish a strict access permission control mechanism, reasonably allocate data access permissions according to the responsibilities and work needs of employees, and only authorized personnel can access sensitive accounting data. At the same time, regularly back up data and formulate a perfect data recovery plan to deal with the situation of data loss or damage.

To solve the problem of AI algorithm bias, in the algorithm development stage, the quality and representativeness of training data should be ensured, the data should be strictly cleaned and preprocessed, and the introduction of data bias should be avoided. Adopt multiple algorithms for cross-validation, comprehensively evaluate the performance of the algorithm, and timely discover and correct the bias in the algorithm. Establish an algorithm audit mechanism, regularly review the operation results of the algorithm, and ensure the rationality and fairness of the algorithm's decision-making process and results.

For the problem of insufficient personnel skills, enterprises should increase the training intensity for accounting personnel, organize targeted training courses, covering the basic knowledge of AI and big data technologies, data analysis methods, operation of automated accounting information systems, etc. Encourage accounting personnel to participate in relevant certification exams and academic exchange activities to continuously improve their skill levels. In addition, enterprises can also introduce professional talents with relevant technical backgrounds to enrich the accounting team and promote the improvement of the overall skill level of the team.

8. Conclusions and Prospects

8.1 Summary of Research Achievements

This study has deeply analyzed the relevant contents of automated accounting information processing and quality improvement based on AI and big data. The research shows that the integrated application of AI and big data technologies has brought far-reaching changes to the accounting information processing process. It has broken the dilemma of traditional accounting information processing in data collection, processing, transmission, and sharing, realized automated data collection, intelligent processing, and real-time transmission and sharing, and significantly improved the efficiency and accuracy of accounting information processing.

In terms of improving the quality of accounting information, AI and big data technologies have played a key role. By reducing human errors, the accuracy of accounting information is improved; by realizing real-time processing and analysis, the timeliness of accounting information is guaranteed; by integrating multi-source data, the completeness of accounting information is enhanced. These improvements provide more reliable and comprehensive information support for enterprise decision-making, helping enterprises better cope with market changes and enhance competitiveness.

Through the case analysis of ABC Manufacturing Co., Ltd., the remarkable effects of AI and big data technologies in automated accounting information processing and quality improvement are

further verified. After implementing the technology, the company has made breakthrough progress in processing efficiency, information quality, and financial decision-making, fully demonstrating the huge application value and potential of new technologies in the accounting field.

8.2 Outlook on Future Development Trends

With the continuous progress of science and technology, the application of AI and big data technologies in the accounting field will continue to deepen and expand. In the future, AI technology will be more intelligent, able to realize more complex accounting business processing and more accurate financial analysis and prediction. For example, through more advanced deep learning algorithms, AI systems can automatically identify and process various complex accounting scenarios, such as the accounting treatment of special businesses and the calculation of complex tax issues. At the same time, AI will also play a greater role in intelligent auditing, risk early warning, etc., helping enterprises timely discover potential financial risks and ensure the financial security of enterprises.

Big data technology will also continue to develop, and the scope of data collection will be more extensive, including not only the structured data inside and outside the enterprise but also more unstructured data, such as social media data, data generated by IoT devices, etc. This will provide more abundant data resources for accounting analysis, enabling enterprises to understand their own financial situation and market dynamics from a more comprehensive perspective. In terms of data analysis, big data technology will be further integrated with AI technology to achieve more efficient and in-depth data mining and analysis, providing more forward-looking financial decision-making support for enterprises.

In order to better adapt to the future development trend of the accounting industry, enterprises should increase investment in and application of new technologies, continuously optimize the accounting information system, and improve the intelligence level and data processing capability of the system. At the same time, it is necessary to strengthen the training and cultivation of accounting personnel, improve their mastery and application ability of AI and big data technologies, so that they can skillfully use new technologies to carry out accounting work and provide more valuable financial services for enterprises. In addition, governments and industry associations should also strengthen the standardization and guidance of the application of new technologies in the accounting industry, formulate relevant policies and standards, ensure the safe and reliable application of new technologies in the accounting field, and promote the healthy and sustainable development of the accounting industry.

References

[1] Bhimani A, Willcocks L. Digitisation,‘Big Data’and the transformation of accounting information[J]. Accounting and business research, 2014, 44(4): 469-490.

[2] Das P K. Accounting Transformation in the Ongoing Era-Challenges and Opportunities[J]. British Journal of Multidisciplinary and Advanced Studies, 2025, 6(1): 27-43.

[3] Das P K. Impact of artificial intelligence on accounting[J]. Sumerianz Journal of Economics and Finance, 2021, 4(1): 17-24.

[4] Mudhulu S, Channegowda M, Balaji S, et al. Trends in graphene-based e-skin and artificial intelligence for biomedical applications—a review[J]. IEEE Sensors Journal, 2023, 23(17): 18963-18976.

[5] Li H, Yang C. Digital transformation of manufacturing enterprises[J]. Procedia computer science, 2021, 187: 24-29.

[6] Ikkos G, Stanghellini G, Morgan A. History, ‘nowtime’ (jetztzeit) and dialectical images: introduction to Walter Benjamin for psychiatry (I)[J]. International Review of Psychiatry, 2024, 36(6): 585-599.

[7] Wang F. Intelligent Command and Smart Control in the Third Axial Age: The DAO to DeSci of Emergence and Convergence for Peace[J]. Journal of Command and Control, 2022, 1(1): 1-11.