



# The Role of Artificial Intelligence in the Accounting Industry

Huiquan Jin<sup>1</sup>, Lei Jin<sup>1,2</sup>, Chongxiao Qu<sup>1,2</sup>, Wei Xiao<sup>1,2</sup>, and Changjun Fan<sup>1,2</sup>(✉)

<sup>1</sup> Cethik Group Co. Ltd., No. 9, Wenfu Road, Hangzhou 311100, China  
jinhuiquan@cethik.com, {jinlei, quchongxiao, xiaowei,  
fanchangjun}@cetc.com.cn

<sup>2</sup> The 52nd Research Institution of China Electronic Technology Group Corporation, No. 9,  
Wenfu Road, Hangzhou 311100, China

**Abstract.** Until now, China's financial accounting has experienced three stages, manual accounting, accounting computerization, and intelligent accounting. Recently, with the development of artificial intelligence (AI), various kinds of intelligent financial software and tools are introduced into the accounting industry, such as Deloitte financial robot and AlphaSense. Based on AI technology, they automate tedious and repetitive work, greatly improving the efficiency of financial work. However, AI also has a few downsides, for example, it will lead to rising unemployment and cause panic among financial practitioners. In this study, we explore the evolution of the accounting industry following the AI technological developments, analyze the role of AI in the accounting industry, assess the advantages and disadvantages AI introduced into the industry, and provide suggestions for future transformation and development of the accounting industry and its practitioners.

**Keywords:** Accounting Industry · Artificial Intelligence · Employment · Accountant · Transformation and Development

## 1 Introduction

With the rapid development of big data and deep learning technologies, the tide of artificial intelligence (AI) is sweeping over the world. The era of AI has brought systematized and data-oriented upgrades as well as continuing developments in operational techniques across industries. Also, it exerts an unprecedented impact on the traditional accounting industry. The rise of AI has brought intelligence and automation to traditional accounting, which makes traditional accounting break the boundaries of traditional work and continuously develop into the field of intelligent accounting.

As a result, more and more companies use intelligent software to perform basic accounting work and adopt robots to replace financial personnel, which compels accountants and auditors to improve their abilities in all aspects to deal with the sweeping AI era. More importantly, this makes the accounting industry upgrade unceasingly to keep pace with the age of AI. Nowadays, it becomes an inevitable trend for AI agents or

robots to carry out the basic operational tasks for human beings. However, they are not without flaws. On one hand, with the efficiency of the industry rising, entry-level or low-level accounting practitioners are very likely replaced by these AI tools. On the other hand, there is still some work that these AI tools cannot do for human beings, and they cannot completely replace humans in all aspects. Next, we will study the role of AI in the accounting industry, analyze the benefits and issues that AI has brought to the accounting industry and its personnel, and give out our suggestions for the future development and transformation of the accounting industry and its personnel.

## **2 Artificial Intelligence and Its Application Analysis**

### **2.1 AI Overview**

Artificial intelligence, called AI for short, is literally a combination of “artificial” and “intelligent”. “Artificial” means made by humans, and “intelligence” involves consciousness, self, and thinking [13]. Thinking produces behavior and language, and “intelligence” optimizes and improves behavior and language. That is to say, let the computer have the ability to think like a human and do the work that can only be done by humans. There are two ways to simulate the thinking process, including structural simulation and functional simulation. The former develops imitated intelligent machines by studying the internal structure and mechanism of the human brain. The latter focuses on simulating the thinking of the human brain. According to whether the AI machine has the ability to think and reason, AI can be divided into “weak AI” and “strong AI”. The former does not have the ability to think, reason, and solve problems independently, which is commonly used in electronic computers. On the contrary, the latter has autonomous consciousness and independent thinking, and can think, reason, and solve problems when dealing with problems. Strong AI can be divided into anthropomorphic AI and non-anthropomorphic AI according to whether its thinking is anthropomorphic. What they have in common is that they both have the ability to think and reason. The difference is that the former is the same as humans when thinking and the latter has a completely different way of thinking, perception, consciousness, and reasoning than people. At present, due to the technology level of “strong AI” being immature, “weak AI” is more prevalent. AI has a wide range of practical applications, including face recognition, intelligent search, audio and image processing, etc., which created significant benefits for many industries. As a new type of infrastructure, AI brings more convenience and possibilities to human life. AI is considered to be good at matching patterns and automating processes, which makes this technology amenable to many functions in large organizations. An environment could be envisioned in the near future where AI will replace a range of functions performed today by human beings. With the deepening of research, AI is combined with accounting information systems and exerts a huge impact on the accounting industry and its practitioners.

### **2.2 Application Requirements Analysis of AI**

It is not the first time someone comes up with the idea of introducing AI in accounting [10]. It is reasonable to expect that its impact on the industry will be more substantial

in the near future because of recent developments in machine learning and big data. Nowadays, the big data and powerful processing ability needed by AI are easily available in large quantities. What's more, there are more and more open source and proprietary versions of AI software, like Tensorflow and Pytorch, which are still constantly emerging. AI has gone through several ups and downs, but in this revival, it is more prosperous and lasts longer than ever before.

Nowadays, applying AI technology to the field of accounting is the general trend. On one hand, productivity in advanced economies has not improved much over the past few years, for example, from 2007 to 2015 the average annual growth rate was only 1.3% [11], so many companies are eager to see if cognitive technologies can ultimately spur productivity growth. Currently, people are usually dealing with huge amounts of data in a very short period of time, based on which, analysis and decision-making need to be done, and this is very difficult or even not feasible. On the other hand, infrastructure including software and hardware suitable for cognitive tasks is improving day by day. Some big companies in the world, such as Google, Microsoft, and Facebook, have all launched open-source machine learning libraries. Although neural networks have come out in the last mid-century, it evolves into a new form named "deep learning" (DL) today. It requires a lot of data to learn and a lot of computing power to solve complex and complicated problems. Nowadays, there are many ready-made data sources for training purposes, like the ImageNet database [5], which has over 14 million images and can be used to train cognitive models to recognize various objects from an image. Moreover, cloud computing resources are becoming more and more abundant, and relatively new processor types, such as graphics processing units (GPUs), are particularly well suited for solving some DL problems, which provides almost unlimited processing power for many cognitive applications. Accounting is particularly well suited for the use of data analytics and AI techniques because there is a lot of structured and unstructured data to process, based on which, insight into the company's financial and non-financial performance is gained. What's more, many financial tasks are repetitive, operational, and therefore can be automated.

### **3 Role of AI in the Accounting Industry**

At present, artificial intelligence has been widely used in the daily work of various industries. Due to the repeat characteristics of accounting work, the application of AI in the accounting industry is more logical. Under the influence of AI, the accounting industry has achieved a qualitative leap from traditional manual to computerized accounting, and then to intelligent accounting. The widespread AI applications have solved some problems in the accounting industry to varying degrees, such as inaccurate accounting information data, poor timeliness of accounting information data, high error rate of accounting information data, and high labor cost. However, at the same time, the application of AI also makes the work of entry-level or low-level employees have the risk of being replaced at any time, making them feel an unprecedented sense of crisis, and introduces new issues coming with AI itself.

### 3.1 Applications of AI in the Accounting Industry

The first commercial application of AI technology in the accounting industry was on March 10th, 2016. As one of the Big Four accounting firms, Deloitte first announced the formal introduction of AI into the daily work of accounting [18]. Then, the other big accounting firms made the same decision, and financial robots or AI agents have been introduced in succession. These companies make use of the characteristics of constantly repeating the same work in the accounting industry to fulfill the work of accounting, auditing, and taxation, which marks the gradual transformation of the accounting industry from traditional to modern.

Financial robots or AI agents can add accounting tasks to the AI-based financial system, and perform most of the work using intelligent technology for financial practitioners, so as to greatly improve work efficiency. The introduction of financial robots or AI agents not only greatly saves labor costs, but also improves the accuracy, reliability, and authenticity of financial data and solves problems such as data errors effectively, compared to traditional methods. Currently, the impact of AI on accounting is particularly pronounced in the area of data acquisition and processing (data extraction, comparison, and validation). This means that AI-enabled technologies are able to locate relevant information, extract information from documents, and make them available to accountants or auditors, who can spend more time concentrating on areas that require a higher level of judgment. For example, AI can fully automate time-consuming tasks like payment transaction testing, and extract any supporting data for further substantive testing [3]. Modern AI tools are increasingly capable of scanning complex electronic documents for keywords and patterns and identifying and extracting relevant accounting information from various sources like sales, contracts, and invoices [1]. Tarmidi *et al.* [17] analyzed source or original documents (e.g., tax invoices) by using Optical Character Recognition (OCR) and utilized AI to help identify suitable accounts to be recorded inside the accounting system. Additionally, financial robots or AI agents can upload and download data across platforms, perform data reconstruction and analysis, and realize the functions of information monitoring and process triggering, which greatly improve efficiency.

Robotic process automation (RPA) is a repetitive and automated process developed from AI technology [6]. Rozario *et al.* [15] pointed out that, RPA is an alternative to traditional automation, which can do repetitive work under fixed rules. In the accounting industry, there are full of basic and repetitive accounting work, which is consistent with the application conditions of RPA. Therefore, RPA has good reason to apply to the financial field, and financial robots are born from this. RPA financial robots are one of the important tools for enterprises to promote digital management transformation. Under the conditions of pre-designed usage rules, RPA financial robots can simulate manual operations and are able to complete a variety of repetitive and continuous simple tasks. In daily accounting work, intelligent financial software can automatically generate financial statements and save human resources [8]. The improvement of work efficiency makes the processing of accounting data and information finished in one day possible, and this is no longer a mere human fantasy. It makes up for the lack of timeliness of accounting information data, greatly improves the timeliness of accounting information data, and ensures the accuracy of accounting information data. It has brought great convenience

and new opportunities for the development of the accounting industry [4]. PwC's 2017 RPA survey found that at least 30% of respondents have started incorporating RPA into their businesses [14]. One major application of RPA in accounting is related to taxation. After the automated software is created, robots are configured to perform repetitive processes such as submitting applications to the tax authority portal. Tax automation allows tax teams in the companies to focus on higher-value work such as research, planning, and analysis. In this process, OCR scanning technology can be employed to read and record paper invoices and store such information in real time, RPA technology can be utilized to perform real-time invoice verification through continuous contact with the government tax bureau database.

What's more, AI can employ new technologies, such as speech and face recognition, to perform judgment-based responses, and it can combine with RPA, which makes the automation more efficient and more continuous. In 2014, Zara's parent company Inditex decided to employ RFID technology to improve the company's supply chain, which improves process automation, helps RPA improve the efficiency of preparing transaction ledgers and financial statements, and results in better sales and profits [2]. Maycur.com is the leading enterprise travel and expense management SaaS platform. It adopts speech recognition technology, which converts speech into structured information and extracts the amount, time, and location of the expense, and fills in the reimbursement form automatically [12]. Natural language processing (NLP) technology can automate the processing of unstructured textual information, systematically and automatically retrieve and review the key points, and free internal financial auditors from onerous reading and review work.

In view of the various advantages of AI technology, its application in the financial field is becoming more and more extensive. Nowadays, as financial robots or AI agents are gradually taking over the basic accounting work step by step, the focus of accounting practitioners is gradually forced to transfer. In the future, AI equipment will gradually replace human resources and become an indispensable part of the accounting industry, and the basic accounting work will no longer be performed by accountants. Because basic and repetitive accounting work is done by smart financial software, accountants have more time and energy to focus on development strategies for decision analysis and business management. This will give accountants a huge boost to focus on their work. And the application of AI technology will motivate some accountants to continuously improve their ability and gradually transform to deal with the risk of being replaced and become high-quality accounting talents. This is good news for companies, but it is a nightmare for almost all entry-level or low-level accounting personnel. The risk of unemployment for the accounting personnel in the future is therefore greatly increased, and the comprehensive transformation of accountants is imminent.

### **3.2 Issues Introduced by AI Technology**

Although the application of AI technology in finance brings convenience to accounting work, there are still some problems that need to be solved.

Firstly, the application of financial robots or AI agents in the accounting industry is not mature, and the lack of unified industry standards makes it have certain limitations. AI-based systems need higher funds to be equipped. In order to maintain the high

configuration of these systems, powerful background servers are needed to support their operation, and such powerful servers need a lot of money to buy. Such a huge fund is unaffordable for many enterprises. Moreover, once the financial robots or AI agents break down, they need timely and systematic maintenance. Both emergency recovery and daily updating and upgrading will also incur a lot of costs, which are not affordable for ordinary enterprises. Therefore, no matter in terms of technology or infrastructure, there is a need for a huge capital reserve to prepare for possible emergencies, and high operation and maintenance costs increase the financial burden of enterprises. Additionally, once the failure of the AI-based system is not timely repaired, the enterprise will fall into chaos in the financial process and affect the normal financial operation of the enterprise. Moreover, due to the application of computing and communication equipment, data security and privacy are still not effectively guaranteed. That is to say, the risk of accounting information and data is uncontrollable, which may lead to information leakage, make the enterprise fall into information chaos and financial chaos, and bring a significant negative impact on the development of the enterprise.

Secondly, in the era of AI, financial robots or AI agents are adopted by many companies, which gradually get the daily job done in lieu of accountants. The emergence of artificial intelligence has reduced accounting work, and the widespread implementation of electronic invoices has also reduced the workload of financial accounting by hundreds of times, making the financial accounting market rapidly saturated. Only in 2017, more than 270,000 graduates left colleges with an accounting degree (bachelor's level and above) in China [7]. But today many universities have stopped enrollment in the accounting undergraduate program and added a "Computer and Finance" program, just like Tsinghua University. This reflects the importance of strengthening the close relationship between AI and accounting, and accounting transformation is imminent. Just like a double-edged sword, AI brings innovations and challenges to the traditional accounting industry. Shi *et al.* pointed out that, accountants engaged in a large number of repetitive, standardizable accounting processes will be completely replaced by more precise and rapid AI, and the adoption of "Deloitte financial robot" has further proved that AI technology continues to extend to deep applications [16]. In the long run, there will be two extremes in the accounting industry, i.e., compound accounting talents and low-end accountants who can only simply operate intelligent systems. Due to the introduction of AI technology, the traditional entry-level or low-level accountants will be gradually eliminated by the modern accounting industry. This leads to the lack of viewpoints from entry-level or low-level accountants, which may hinder the development of the accounting industry to some extent on the other hand and is very unfavorable to the future of the accounting industry.

#### **4 Suggestions for the Accounting Industry and Its Personnel**

The era of AI has put forward new requirements for the accounting industry and its practitioners. To better seize opportunities and meet challenges, the accounting industry and its practitioners should do the followings.

#### **4.1 Cultivating a Positive View on AI**

Although the application of AI may reduce the need for traditional accountants, it will accelerate the improvement of the overall quality of accountants, facilitate the transformation of traditional accounting, and make it adapt to the needs of the new era. The application of AI has optimized the staff structure of accountants to a large extent and promoted the transformation of low-level accountants to high-level accountants. Therefore, we must evaluate AI comprehensively and objectively, and treat it positively. It is harmful to treat AI negatively, which is not conducive to its own development, nor to the rapid development of the whole society. Nowadays, in the era of “weak AI”, AI cannot completely replace human intelligence and operational capabilities. Compared to experienced accountants, AI has huge advantages in computing power and responding speed. However, AI is created by humans, and it usually lacks intuition and common sense and cannot have the ability to reason, which makes it not as good as experienced humans. Therefore, accountants need to correct their attitude, correctly view the relationship between traditional accounting and modern AI, and have a clear understanding of the application of AI in the accounting industry. This will avoid the appearance of negative opinions, which will affect the confidence and enthusiasm of accounting practitioners.

#### **4.2 Designing and Implementing AI-Based Accounting Information Systems**

AI-based accounting information systems require the cooperation of computer experts who understand IT development and professional accountants who understand accounting knowledge. The former is mainly responsible for developing intelligent computing tools, and the latter are practitioners of main accounting theories. Only by cooperating with each other, complementing each other, and complementing each other's advantages, can they play a synergistic role in the research, development, maintenance, and upgrade of AI-based accounting information systems, and promote healthy development of AI in the accounting industry. It is not possible to fulfill the accounting work simply by counting on the programmed and formalized accounting software. Some unordinary jobs that require professional judgment still require accountants to deal with flexibly based on experience and knowledge. Additionally, there are still technical loopholes in the security of intelligent financial software. Accountants should enhance their awareness of risk prevention, always supervise and prevent information leakage and other security issues, and act as the designer and supervisor of the accounting system in the era of intelligent accounting.

#### **4.3 Improving the Ability to Use AI-Based Accounting Systems**

Accounting practitioners should understand the current reform situation and form, constantly improve themselves, enhance their comprehensive ability, so as to comply with the development trend of the times. Especially for low-level accountants, they are easily replaced by AI-based tools, and it is not enough for them to have a piece of single accounting knowledge. It is necessary for them to improve their own capabilities, actively adapt to the changes in modern accounting, and actively learn auditing, taxation, strategy, etc., while absorbing the constantly updated accounting knowledge. All accountants should

strengthen their understanding of AI, and master and make reasonable use of AI technology. They should learn some operating skills related to AI-based financial systems, and gradually keep up with the pace of the times. Since AI-based systems are not completely intelligent, they still need humans to operate. Moreover, not all the work can be performed by financial robots or AI agents. Financial practitioners should improve their ability to mine, analyze and understand data, do work that artificial intelligence can't do, and become comprehensive or compound accounting talent. Entry-level or low-level accountants should prepare for risks of unemployment, strive to have a place in the accounting industry, and at least not be eliminated by the times. In addition, entry-level or low-level accountants need to learn computerized accounting processing and related operations. When the enterprise does not have enough budget to buy AI-based intelligent software or equipment, they can still use the computerized accounting software to carry out some basic accounting processing.

#### **4.4 Enhancing AI-Oriented Accounting Industry Education**

In the era of AI, the transformation in the business and financial areas due to AI applications resulted in reform in the accounting industry and new roles for its personnel. Accountants are no longer preparers of historical financial data, and their new roles need them to have the following abilities, including business awareness and understanding, strong numeracy skills, and data analytics. This challenges the accounting educators to enhance the technological content of accounting courses, including but not limited to artificial intelligence, big data, and so on. Due to the AI applications, new job tasks will arise. As the research by ICAEW put it, accountants will need to be involved in training or testing financial models or auditing algorithms, managing the inputs or outputs, such as exception-handling or preparing data, or helping frame the problems and integrate results into business processes [9]. This makes data analytics and deep learning-related technologies be necessary for accountants to learn. Therefore, universities should play an important role in this process as initiators for curricula review and relevant skill tests. Accounting educators should adapt curricula and syllabi to the current labor market requirements and employers' expectations from graduates, and develop new skill sets for future accounting jobs.

## **5 Conclusions**

With the advent of the AI era, intelligent technologies are gradually applied in the accounting industry, which brings both opportunities and challenges to the accounting industry and its practitioners. On one hand, AI-based systems play an important role in improving business efficiency, reducing work errors, preventing and controlling enterprise risks, improving enterprise competitiveness and human resource efficiency, and cause many opportunities for new emerging important roles and jobs, which revolutionizes the traditional accounting industry. On the other hand, AI is impacting and will further impact the role of accountants and replacing entry-level or low-level accountants to perform basic operational tasks; at the same time, AI development is far from perfect and cannot completely replace human beings. This points out the direction for the



future development of intelligent accounting. In this paper, we analyzed the advantages and disadvantages AI brings to the accounting industry and its personnel, and provide suitable suggestions for them to seize opportunities and meet challenges in the era of AI.

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