

Application of "ERNIE Bot" in Primary Accounting Practice

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Abstract: *This paper explores the capabilities and application potential of the knowledge-enhanced large language model, ERNIE Bot (version 3.5), in entry-level accounting work. By administering tests on ERNIE Bot using topics from the junior accountant qualification exam, we evaluate its mastery of fundamental accounting knowledge and its exam-taking abilities. While current test results indicate that ERNIE Bot has not yet achieved the passing score for the junior accountant certification, its potential for judgment, induction, analysis, and calculation in future practical applications remains promising. In the context of big data, accountants also need to grasp relevant technologies and tools for big data analysis, leveraging large language models to enhance work quality.*

Keywords: *Artificial Intelligence, ERNIE Bot, Junior Accountant Exam, Accounting Work*

1. Introduction

Artificial intelligence (AI) has emerged as a pivotal force driving new-quality productivity and high-quality development, with increasing industries adopting smart AI technologies to enhance efficiency and accuracy. Facing the widespread application of intelligent data and the transformation of financial accounting, more standardized work modes and stricter industry standards continue to emerge, thereby imposing higher standards and updated requirements on the professional knowledge and abilities of accounting professionals.

With the rapid development of domestic large language models, ERNIE Bot has been increasingly applied in various fields such as media, entertainment, and finance, enabling human-like conversations, answering questions, assisting in content creation, and efficiently facilitating access to information, knowledge, and inspiration [1]. It is also frequently compared with foreign counterparts like ChatGPT. For instance, ChatGPT 4.0 surpassed approximately 90% of candidates in the U.S. Law School Admission Test (LSAT) and achieved a score of 1300 out of 1600 in the SAT [2]. As a popular knowledge-enhanced large language model in China, it is intriguing and anticipated to see how ERNIE Bot performs in professional qualification exams in the accounting field.

According to China's Ministry of Finance's "14th Five-Year Plan for Accounting Reform and Development," the number of applicants for the junior accountant qualification exam reached 3.448 million in 2023, with a potential for steady growth in the future. This underscores the pivotal role of China's accounting qualification exams in selecting and evaluating outstanding accounting talents. To assess the application and development potential of AI in junior accountant work practices, this paper tests ERNIE Bot (version 3.5) using topics from the junior accountant qualification exam, evaluates its mastery of fundamental accounting knowledge and exam-taking abilities, and explores the practicality and possibilities of specialized AI in the field of basic accounting practice.

2. ERNIE Bot Testing

2.1. Test Subjects

This study employs authentic questions from the 2023 Junior Accountant Professional Qualification Examination for testing, divided into two subjects: Junior Accounting Practice and Fundamentals of Economic Law. The Junior Accounting Practice Examination comprises a total of 55 questions for 100 points, including 20 single-choice questions (2 points each), 10 multiple-choice questions (2 points each), 10 true-or-false questions (1 point each), and 15 case-based multiple-choice questions (2 points each), covering 42 key knowledge points in the field of accounting. The Fundamentals of Economic Law

Examination comprises 23 single-choice questions (2 points each), 10 multiple-choice questions (2 points each), 10 true-or-false questions (1 point each), and 12 case-based multiple-choice questions (2 points each), covering 34 key knowledge points in the field of accounting.

2.2. Test Protocol

To ensure the accuracy and consistency of ERNIE Bot's responses, each subject was tested twice in separate sessions with new dialogues initiated on different days. The test content remained unchanged between the two sessions. The first test was conducted following standard exam protocols, while the second test required ERNIE Bot to provide explanations and reasoning for its choices. After both tests, the average scores, answer consistency, and repetition rate of accurate answers were calculated to assess ERNIE Bot's mastery of basic accounting knowledge and its analytical problem-solving abilities. The testing protocol is illustrated in Figure 1.

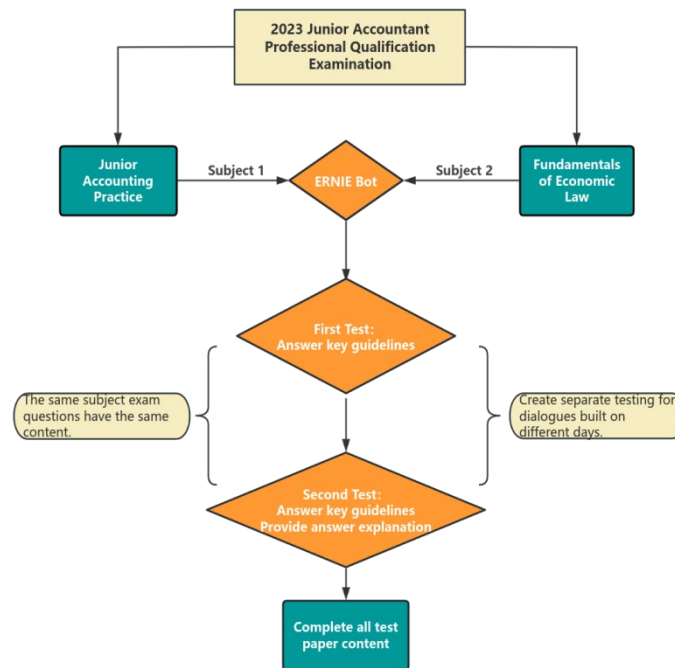


Figure 1: "ERNIE Bot" Testing Protocol.

3. ERNIE Bot Test Results and Analysis

3.1. Overall Results

ERNIE Bot scored an average of 52 points in Junior Accounting Practice and 50.5 points in Fundamentals of Economic Law, failing to pass the junior accountant qualification exam. The details are shown in Table 1 below.

Table 1: "ERNIE Bot" Test Results.

Testing evaluation project \ Subject/Question type	Junior Accounting Practice					Fundamentals of Economic Law				
	Total (55 questions)	single-choice questions (20 questions)	multiple-choice questions (10 questions)	true-or-false questions (10 questions)	multiple-response questions (15 questions)	Total (55 questions)	single-choice questions (23 questions)	multiple-choice questions (10 questions)	true-or-false questions (10 questions)	multiple-response questions (12 questions)
First test average score	51.5	17	12	9.5	13	44.5	19	11.5	6.5	7.5
Average score of the second test	52.5	20	12.5	7	13	56.5	26	14.5	6	10
Average score	52	18.5	12.25	8.25	13	50.5	22.5	13	6.25	8.75
Accuracy rate (%)	52	46.25	61.25	82.5	43.33	50.5	48.9	65	62.5	36.5
Answer consistency rate (%)	60.90%	57.50%	70%	95%	36.70%	60%	65.22%	45%	85%	41.70%
reproducibility rate of correct answers (%)	66.70%	67.60%	79%	95%	36.40%	76%	86.10%	49%	79%	33.30%

In the two tests conducted, the overall score of the second test, which mandatorily required ERNIE Bot to provide explanations for its answers, was higher than that of the first test. A comparison between the two tests revealed that the consistency rate of aggregated answer selections was approximately 60%, while the recurrence rate of accurate answers reached approximately 72%. These findings indicate a certain degree of instability in ERNIE Bot's responses. Furthermore, when the tasks input to the AI are more detailed and specific, the AI's output becomes more creative, a phenomenon also known as "prompt engineering" [3].

Upon analyzing the question types, it was observed that ERNIE Bot achieved the highest accuracy rate in true-or-false questions and the lowest score in multiple-choice questions with unfixed options. This disparity may stem from the fact that true-or-false questions typically involve a more straightforward and focused set of knowledge points, allowing ERNIE Bot to effectively discern answers through its database. In contrast, multiple-choice questions with unfixed options require ERNIE Bot to intelligently read and analyze entire passages, extract key knowledge points, potentially perform calculations, and filter through multiple options. Even if the correct option can be identified, it is challenging to ensure complete and accurate filtering.

3.2. Overall Analysis

Using exams with standardized answers or scoring criteria to test can serve as a good judgment standard for generative artificial intelligence in solving knowledge-based problems[4]. Based on the data results of this test, ERNIE Bot, as an intelligent question-answering system based on natural language processing technology, has certain advantages in answering questions related to financial and accounting knowledge. However, in practical applications, its performance has not met external expectations and cannot yet replace professional Certified Public Accountants (CPAs).

1) ERNIE Bot failed to pass the Junior Accounting Practice and Fundamentals of Economic Law sections of the Junior Accountant Qualification Examination, indicating a gap compared to the average performance of professional junior accountants.

2) ERNIE Bot exhibits inadequate comprehension of complex semantics, multi-layered instructions, and factual nuances within the accounting domain. It still struggles with intricate computational problems, and its logical analysis and response capabilities are inconsistent.

3) To a certain extent, ERNIE Bot possesses the ability to recognize, comprehend, evaluate, and analyze basic accounting terminology and economic law. This capability underscores the potential for further exploring its intelligent applications in the accounting field, such as by curating comprehensive and reliable accounting training datasets and engaging professional accountants in feedback-driven training sessions.

4) ERNIE Bot has the potential to evolve into an auxiliary learning tool. For instance, candidates could leverage its automatic scoring for exam preparation and personalized question generation. Moreover, by intelligently analyzing the difficulty distribution and knowledge point coverage of exam questions, it could facilitate timely adjustments to study strategies, enhancing the efficiency and accuracy of preparation for the Junior Accountant Examination. Additionally, this could provide valuable insights for exam setters and educators.

This test and evaluation have certain limitations. On one hand, ERNIE Bot was not trained with financial accounting professional datasets, leading to differences in terminology definitions. On the other hand, the test samples only used the 2023 Junior Accountant Professional Qualification Examination, with a small sample size. This does not fully account for ERNIE Bot's professional capabilities in the financial accounting field, which will be improved in subsequent research. Despite the shortcomings in this study, it has shown that ERNIE Bot cannot completely replace human engagement in financial accounting professional work, emphasizing the importance of accountants' continuous involvement and professional judgment.

4. Exploration of ERNIE Bot's Application in Entry-Level Accounting Work

Generative artificial intelligence, through extensive training and learning from vast amounts of data, has acquired fundamental comprehension and synthetic creativity [5]. The Chinese corpus training dataset utilized by ERNIE Bot represents the largest Chinese corpus to date, positioning it as a leading knowledge-enhanced large language model in China. However, according to publicly available

information from Baidu, ERNIE Bot has not undergone specific annotations using financial accounting datasets or training by certified public accountants (CPAs). The Qualification Examination for Entry-Level Accountants serves as a professional entry-level test for accounting practitioners [6]. For ERNIE Bot to achieve a more substantial scale of human-machine coupling in entry-level accountant work practices, it necessitates employing accurately annotated professional datasets for deep learning of financial expertise, as well as targeted training by professional CPAs to unlock its immense potential for practical applications in the field of accounting and finance.

The emergence of big data has greatly changed the operational mode and value positioning of the traditional accounting industry. This not only impacts accountants in terms of changes in workload and increased complexity but also raises higher demands for their business and data analysis capabilities. [7]. During recruitment, some corporate financial accounting departments prioritize candidates' data analysis skills, statistical knowledge, programming abilities, and relevant experience to ensure new hires possess the capacity to handle big data [8]. The outline of the 2023 Junior Accountant Professional Qualification Examination has added basic knowledge of financial shared services centers, financial robots, and financial big data applications, underscoring the inseparable link between financial accounting work and the era of big data development. Even entry-level accountants are required to possess a certain level of proficiency in big data. Accountants should continuously learn and master the relevant knowledge and skills of large language models and big data tools, enhancing collaboration with intelligent tools to utilize AI for improved efficiency while maintaining professional control over critical decisions and complex situations. By integrating AI's automation, data processing capabilities with human creativity and critical thinking, we can jointly promote the quality and efficiency of financial accounting work, catering to the demands of the information age and creating greater value for enterprises.

It is evident from our test results that a straightforward integration of ERNIE Bot into practical work is unrealistic. Nonetheless, its strengths in swiftly extracting and judging critical information, integrating intricate and fragmented data, and performing recognition, induction, and analysis can be fully leveraged to become a valuable assistant in the workplace. There exist various collaboration modes between humans and AI, including assistant mode, companion mode, team mode, and multi-round collaboration mode, which can all be applied in practical work settings to enhance efficiency and facilitate the business transformation of accounting.

5. Conclusion

In the context of the big data era, the application of intelligent language models holds significant importance for enhancing the timeliness of human knowledge production. Nevertheless, we must be cognizant that AI cannot fully replace human thought processes and should not be hastily applied directly to practical work. This development trend poses new challenges and requirements for financial accounting personnel. They must not only continuously refine their professional skills within the field but also actively embrace and appropriately apply new technologies, aligning with the trend to become beneficiaries of AI.

In summary, intelligent language models exhibit broad application prospects and immense value in entry-level accounting work. Nevertheless, fully leveraging their advantages necessitates addressing technical and practical challenges. With the continuous development and advancement of technology, it is believed that these issues will be appropriately resolved, enabling wider application of intelligent language models in the accounting sector and providing robust support for optimizing China's employment structure and promoting high-quality talent development.

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