

The audit revolution: Integrating artificial intelligence in detecting accounting fraud

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Abstract

This study aims to analyze the application of Artificial Intelligence (AI) in detecting accounting fraud in audits. The aim is to identify AI's efficiency, accuracy, and potential in detecting fraud and to explore the challenges and implications arising from using this technology in audit practice. This research is a type of qualitative research with a case study approach as the main focus and a literature study as a data triangulation approach. This research methodology will provide an in-depth understanding of the integration of artificial intelligence in detecting accounting fraud. The results show that AI improves efficiency and accuracy in detecting accounting fraud. AI techniques such as machine learning and natural language processing effectively identify fraud patterns. However, there are challenges, such as limitations of AI technology, ethical and data privacy issues, and barriers to accepting AI in the accounting industry. This research contributes to the accounting literature by highlighting how AI can change audit practices. It also offers guidance for accounting firms on utilizing AI to improve auditing and suggests directions for future research related to the development and integration of AI in accounting.

Keywords: Artificial Intelligence; Auditing; Ethics and Data Privacy; Fraud Detection; Machine Learning.

Abstrak

Penelitian ini bertujuan untuk menganalisis penerapan Kecerdasan Buatan (AI) dalam mendeteksi kecurangan akuntansi dalam audit. Tujuannya adalah untuk mengidentifikasi efisiensi, akurasi, dan potensi AI dalam mendeteksi kecurangan, serta untuk mengeksplorasi tantangan dan implikasi yang timbul dari penggunaan teknologi ini dalam praktik audit. Penelitian ini merupakan jenis penelitian kualitatif dengan pendekatan studi kasus sebagai fokus utama, serta studi kepustakaan sebagai pendekatan triangulasi data. Metodologi penelitian ini akan memberikan pemahaman yang mendalam tentang integrasi kecerdasan buatan dalam mendeteksi kecurangan akuntansi. Hasil penelitian menunjukkan bahwa AI meningkatkan efisiensi dan akurasi dalam mendeteksi kecurangan akuntansi. Teknik AI seperti pembelajaran mesin dan pemrosesan bahasa alami efektif dalam mengidentifikasi pola kecurangan. Namun, terdapat tantangan seperti batasan teknologi AI, isu etika dan privasi data, serta hambatan dalam penerimaan AI di industri akuntansi. Penelitian ini memberikan kontribusi pada literatur akuntansi dengan menyoroti bagaimana AI dapat mengubah praktik audit. Penelitian ini juga menawarkan panduan bagi perusahaan akuntansi tentang memanfaatkan AI untuk meningkatkan audit dan menyarankan arah untuk penelitian masa depan yang terkait dengan pengembangan dan integrasi AI dalam akuntansi.

Kata kunci: Audit; Deteksi Kecurangan; Etika dan Privasi Data; Kecerdasan Buatan; Pembelajaran Mesin.

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INTRODUCTION

In the past decade, the accounting industry has undergone a significant transformation due to the adoption of advanced technologies such as Artificial Intelligence (AI) (Zhang et al., 2020). AI technology brings the potential for a fundamental transformation in the world of accounting, allowing companies to improve operational efficiency and data accuracy. Some of the roles and impacts of artificial intelligence in accounting include improving productivity and output quality, process automation, data analytics, personal continuity and experience, and data security and privacy (Munoko et al., 2020). AI has promised a revolution in various aspects of business, including in detecting accounting fraud (Lutfiyya et al., 2021). Accounting fraud, which can be fatal to a company's economy and reputation, has always been a major concern in the industry. With the rise of complex accounting fraud cases, traditional methods of auditing and fraud detection are often no longer sufficient (Baten, 2018). This is where AI enters the arena, offering much higher capabilities in the analysis of large and complex data, which is common in the world of modern finance.

Previous studies have revealed that AI, especially technologies such as machine learning and natural language processing, can play a significant role in improving the accuracy and efficiency of accounting audits. The study by Kumar et al., (2021) showed that the use of AI algorithms can significantly reduce the time required to audit financial transactions while improving fraud detection capabilities. On the other hand, a study by Munoko et al., (2020) highlighted that despite technological advancements, there are still concerns related to data privacy and ethics, as well as the acceptance of AI among accounting professionals. While previous research has provided valuable insights, there are still research gaps. Most studies focus on the technical aspects of AI or its impact on audit procedures. However, there are less exploration of how AI can be effectively integrated into a dynamic audit environment while addressing ethical and privacy challenges. In addition, the lack of research incorporating auditors' practical perspectives on adopting AI is an important gap that needs to be addressed.

This research aims to explore how AI can be integrated into the audit process to detect accounting fraud more effectively. The goal is to understand the potential of AI in identifying unusual patterns and indicators of fraud that conventional methods may not detect. This research is important because it can provide new insights into the use of AI in accounting practices, assisting companies in applying this technology to improve the integrity and reliability of their financial statements. The scope of this research is limited to the application

of AI in fraud detection in accounting, with a particular focus on forensic auditing. This research does not cover other aspects of AI in accounting, such as process automation or predictive analytics. The main limitation of this research is the availability of public data related to the implementation of AI in fraud detection, as well as the sensitivity and confidentiality of data related to real fraud cases.

LITERATURE REVIEW

Definition and History of Artificial Intelligence

Artificial Intelligence (AI) is a field of computer science that focuses on developing intelligent systems and machines capable of performing tasks previously limited to human capabilities (Salehi & Burgueño, 2018). The concept of AI emerged in the 1950s and has since undergone rapid development. From its early stages as a theoretical concept, AI has now evolved into a technology with a wide range of practical applications in sectors such as medicine, education, finance, and accounting (Haldorai et al., 2020). The advancements in computing capacity, availability of big data, and improvement in data processing and analysis algorithms have contributed to the progress of AI (Segato et al., 2020). AI enables automation and efficiency in tasks that previously required human intervention (Kaspar et al., 2021), offering potential for increase productivity and effectiveness across various sectors, while also opening new avenues for research and innovation.

There are four stages in the development of artificial intelligence (AI) applications. The first stage, Data Management, involves collecting, processing, and storing the data required to train and test AI models. The second stage, Model Selection, involves evaluating and selecting the model that best suits the desired application goals. The third stage, Development, involves training and testing the model using the pre-processed data. The final stage, Operational, involves implementing the AI model into an ongoing production and maintenance environment. Understanding and executing these four stages well will help in developing and operating effective and successful AI applications. With a structured approach, AI application development can maximize the potential of artificial intelligence for multiple purposes in various fields (Akula & Garibay, 2021).

Accounting Fraud: Definition and Types

Accounting fraud refers to the deliberate manipulation of an entity's financial statements to give a false or misleading picture of its financial condition. This type of fraud can include revenue inflation, cost shifting, improper use of reserves, and incomplete or



misleading disclosures (Sawangarreerak & Thanathamathsee, 2021). Accounting fraud can be committed for various purposes, such as increasing the company's share price, meeting financial targets, or hiding poor financial performance (Holzman et al., 2021).

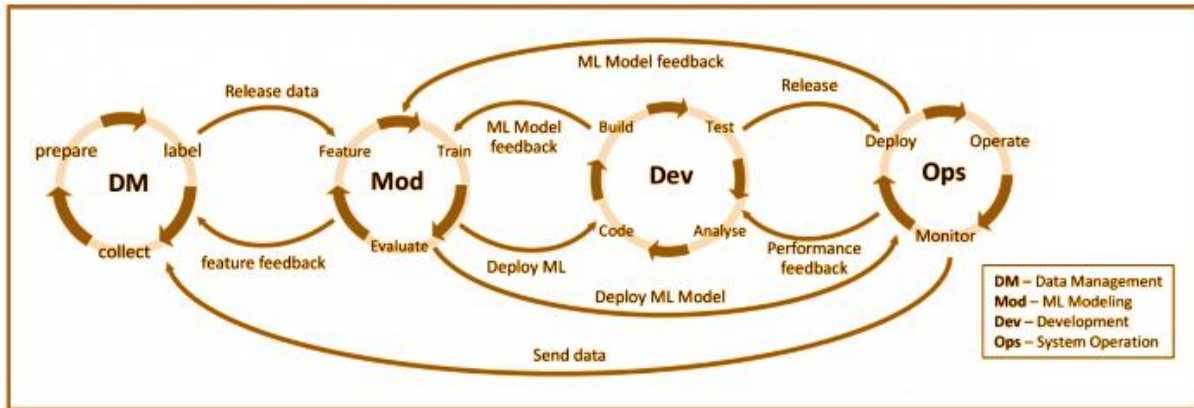


Figure 1. Four Phases of AI Application Development: Data Management, Model Selection, Development, and Operation
Source: Akula & Garibay (2021)

Some examples of accounting fraud include first, financial statement fraud: Hiding financial information, adjusting financial statements to increase stock prices, or causing liability fraud, asset fraud, inadequate disclosure fraud, e-commerce fraud, bankruptcy fraud, tax fraud, and customer fraud (Ashtiani & Raahemi, 2021). Second, Corruption: Abusing official authority or power for personal gain (Alvarez, 2020). Third, internal fraud: Illegal acts of employees, managers, and executives against the company, such as manipulation of disclosures, inflation of revenue, or cost shifting (DuHadway et al., 2022). Fourth, external fraud: Fraud committed by customers against businesses, taxpayers against governments, or policyholders against insurance companies (Garnefeld et al., 2019). Accounting fraud can occur in various countries, including Indonesia. As a result, the losses incurred can be very large (Jaswadi et al., 2022). Therefore, an entity needs to ensure transparency and accountability in the financial control process to prevent the occurrence of fraud.

The Role of Technology in Audit and Finance

In recent decades, technology has played a significant role in transforming the audit and finance industry. The use of accounting information systems (AIS), databases, and data analysis tools has improved audit efficiency and effectiveness (Lehenchuk et al., 2021). More recently, AI has emerged as a tool that has the potential to change the way audits are conducted. AI enables data analysis on a large scale and with a high degree of precision, which can help in the early detection of signs of accounting fraud (Munoko et al., 2020). The use of AI in auditing also helps in faster and data-driven decision-making, which is a

significant step forward compared to traditional auditing methods that rely more on samples and manual checks (Khan et al., 2021).

Some of the advantages of AI in auditing include (1) Efficiency: AI can facilitate auditors in conducting reviews related to documents that must be reviewed, such as preparing, authorizing, distributing, collecting, managing, and evaluating results (Hu et al., 2021); (2) Effectiveness: AI enables data analysis automatically and faster than humans for identifying potential errors and fraud (Ulldemolins et al., 2022); (3) Decision-making: AI helps in faster and data-driven decision-making, which is a significant step forward compared to traditional auditing methods that rely more on samples and manual checks (Batarseh et al., 2021); and (4) Reducing risk: The combination of drones and AI technologies, such as Google Earth Pro, can help spot risks early in terms of assessing assertions of occurrence and existence (Ciaburro & Iannace, 2020).

Although AI has provided some advantages in auditing, the use of AI technology in the audit process also leads to some issues, such as the lack of public trust in the audit results produced by AI (Li et al., 2021). However, overall, AI has had a positive impact on the audit and finance industry by increasing efficiency, effectiveness, and accuracy in the audit process.

METHOD

This research is a type of qualitative research with a case study approach as the main focus, as well as a literature study as a data triangulation approach. The research method used in this research can be described using the following research stages (1) Identification of Research Problems: Identify problems relevant to the integration of artificial intelligence in detecting accounting fraud; (2) Literature Review: Conduct a literature review to understand the concepts and theories related to this research topic; (3) Selection of Research Approach: Selecting a qualitative case study approach as the main research method; (4) Data Collection: Collect secondary data through a literature review that includes scientific journals. In this study, 95.65% comes from reputable journals, namely 30 from Q1-indexed journals, 14 from Q2-indexed journals, and the remaining 4.35% comes from relevant sources; (5) Data Analysis: In analyzing the literature, artificial intelligence was used, namely humata and typeset, to systematically analyze secondary data by identifying main themes and comparing also synthesizing findings; (6) Triangulation Approach: A data triangulation approach is used by comparing and confirming analysis results from different data sources; and (7)



Interpretation and Conclusion: Interpreted the research findings and came up with a comprehensive conclusion on the integration of artificial intelligence in detecting accounting fraud.

This research methodology is expected to provide an in-depth, credible, and comprehensive understanding of the ongoing audit revolution phenomenon. By using a qualitative case study approach and a triangulation approach through literature study, this research will make a significant contribution to the understanding of the integration of artificial intelligence in detecting accounting fraud.

RESULTS AND DISCUSSION

Artificial Intelligence in Accounting Auditing

The use of AI in detecting accounting fraud has grown significantly, relying on a variety of advanced techniques (Albizri et al., 2019). These techniques include machine learning, Natural Language Processing (NLP), and neural networks. Machine learning allows systems to identify patterns in financial data that may indicate fraud (Ali et al., 2022). For example, machine learning models can be trained to recognize patterns in unusual accounting journals, which are often indicators of manipulation. NLP is used to analyze text in financial statements and related communications, looking for inconsistencies or language changes that may indicate problems. Artificial neural networks offer the ability to analyze very large and complex financial data, learning from previous examples to improve fraud detection on an ongoing basis (Daliri, 2020).

Certain AI algorithms have proven to be very effective in accounting auditing (Munoko et al., 2020). These algorithms include rule-based models, classification models, and clustering algorithms. Rule-based models use a defined set of rules to identify suspicious transactions. Classification models, such as decision trees and random forests, are used to classify transactions as normal or suspicious. Clustering algorithms, such as K-means or hierarchical clustering, are used to identify unusual groups of data that may indicate patterns of fraud. The use of these techniques in auditing allows auditors to identify fraud risks faster and more accurately than manual methods (Ashtiani & Raahemi, 2021).

Audit continuity and scaling AI algorithms play a critical role. In this process, auditors are provided with various levels of access, ranging from surface level to deep internalization. The complexity of the technological knowledge spectrum, which is a continuum with "shades of gray" rather than a black-and-white dichotomy, facilitates a more

comprehensive assessment of technological innovation, including vulnerability assessment and determination of the appropriate level of transparency. The variety of audit coverage spans the spectrum from "process access" to "white-box", as illustrated in figure 2 (Akula & Garibay, 2021):

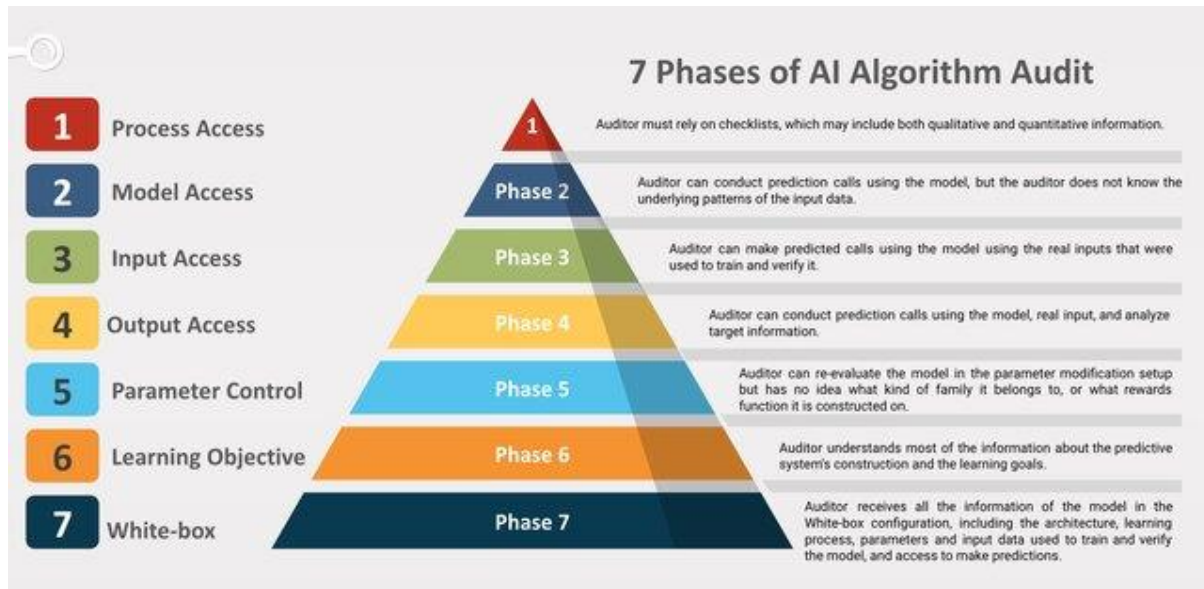


Figure 2. Seven Potential Phases for the AI Algorithm Audit
Source: Akula & Garibay (2021)

Case Study: AI Applications in the Real World

The following case study illustrates how AI is being applied in the real world. Since 2016, Deloitte, a consulting and professional services firm operating in auditing, accounting, consulting, and other financial services, has integrated AI into its ecosystem through a partnership with Kira Systems to create Argus, a machine learning-based cognitive tool to support the audit process. Deloitte continues to be committed to advancing AI in its business. They use various AI in accounting, such as Guided Risk Assessment Personal Assistant (GRAPA) to help auditors evaluate risks, AI Chatbot to help staff understand audit regulations and standards, Behavior and Emotion Analytics Tool (BEAT) for voice and interaction analysis, and other technologies such as Deloitte Signal, Deloitte Optix, Deloitte Connect, and I-count to solve accounting problems.

The next case study is PwC, the second-largest professional services firm by revenue, which has implemented AI in its efforts. In October 2017, PwC's GL.ai technology received the "Audit Innovation of the Year" award from the International Accounting Bulletin. GL.ai was developed with H2O.ai, a Silicon Valley startup that creates AI systems for analyzing documents and compiling reports. PwC explained that GL.ai continues to learn

and improve with each audit using AI techniques, including reinforcement learning. GL.ai has been trained using audit data from Canada, Germany, Sweden, and the UK. PwC has also invested significant resources in Natural Language Processing (NLP), the technology that powers AI. With the help of NLP, GL.ai can understand complex lease agreements, revenue contracts, and board meeting minutes and generate valuable insights for clients.

Benefits and Potential of AI in Auditing

AI has benefits in the audit process, including efficiency and accuracy in fraud detection as well as fraud prediction and prevention (Mökander & Floridi, 2021). Artificial Intelligence (AI) brings significant improvements in the efficiency and accuracy of the audit process, especially in fraud detection (Almufadda & Almezeini, 2021). With its ability to process and analyze huge amounts of data quickly, AI reduces the time required to audit transactions significantly. AI algorithms can identify unusual patterns or exceptions in data that may not be detected by human auditors (Ntoutsis et al., 2020). This increases the accuracy of fraud detection, reduces the risk of human error, and provides a more objective analysis. In addition, AI can continuously learn and adapt to new trends in data, ensuring a dynamic and progressive approach to auditing. One of the biggest advantages of AI in auditing is its ability that not only to detect but also to predict fraud. Through predictive models, AI is able to identify fraud risks before they occur (Bao et al., 2020). This allows organizations to take preventative measures, potentially saving significant resources and protecting the company's reputation. By analyzing historical trends and data patterns, AI can alert auditors and financial managers of high-risk areas, allowing them to focus their audit efforts more efficiently (Zhang et al., 2019).

The use of Artificial Intelligence (AI) in accounting auditing is having a significant transformational impact on the profession. AI is changing the traditional role of auditors by shifting attention from routine and repetitive tasks to more strategic analysis and data-driven judgment (Raschke et al., 2018). This requires auditors to adapt their skills and education, with greater emphasis on technological expertise and data analysis. AI integration also opens up new opportunities in auditing. For example, with AI, audits can be conducted on an ongoing basis, where systems can automatically monitor and analyze data continuously to detect anomalies or indications of fraud. In addition, AI also enables the application of predictive analysis in auditing, where the system can use historical data and algorithms to provide forecasts about future financial risks and performance (Rikhardsson et al., 2022). The use of AI in accounting audits also has the potential to increase the value and relevance of

audits in business decision-making. With AI's ability to analyze large-scale and complex data, auditors can identify previously undetected patterns or trends, providing valuable insights to company management (Zhou, 2020). This allows for better, evidence-based decision-making.

Challenges and Obstacles in Auditing

While AI has shown tremendous potential in accounting auditing, there are still technological limitations to be aware of. One of the main challenges is the need for high-quality data. AI relies on accurate and complete data to operate effectively (Hand & Khan, 2020). However, in practice, incomplete or biased data can lead to errors in machine learning, known as 'garbage in, garbage out'. In addition, current AI still requires human supervision for interpretation of results and adjustment to unforeseen circumstances (Tiberius & Hirth, 2019). This reliance on human input raises questions about the extent to which AI can fully automate the audit process.

The use of AI in auditing also raises significant ethical and data privacy questions. AI often requires access to large amounts of sensitive corporate data, posing data security risks (Lee, 2019). There are concerns about how this data is collected, stored, and used, especially when it involves employees' personal information or sensitive financial data. In addition, decisions made by AI can affect a company's reputation and financial performance, raising questions about responsibility and transparency in AI decision-making (Buiten, 2019).

While AI offers many advantages, its acceptance in the accounting industry is often hampered by a number of factors. Resistance to change is one of the main challenges. Many accounting professionals may feel uncomfortable with new technologies or worried about the impact of AI on their work (Hanetseder et al., 2021). These concerns may lead to slow adoption of AI in some organizations. In addition, lack of understanding or skills in AI may hinder its integration in accounting practices (Banța et al., 2022). To address this, it is important for companies and educational institutions to provide the necessary training and resources to understand and implement AI effectively.

Analysis and Discussion

This research explores several cases where AI has been applied in accounting auditing to detect fraud. From these cases, several key findings have emerged. First, the application of AI can significantly improve the speed and accuracy in identifying suspicious transactions. Second, AI helps in identifying complex fraud patterns that may be missed by traditional methods. Third, the integration of AI in auditing has shown the potential to predict



future fraud risks, rather than just detecting them after the fact. These findings show that AI not only acts as a support tool but also as an innovator in the field of auditing.

Compared to traditional auditing methods, AI offers distinct advantages (Yang, 2022). Traditional methods often rely on sampling and manual checks, which can be time-consuming and prone to errors. In contrast, AI enables comprehensive data analysis, increasing the likelihood of detecting fraud. Moreover, AI has the ability to process and analyze data at unprecedented speeds and volumes, surpassing human capabilities (Panch et al., 2019). However, the implementation of AI requires a significant initial investment in terms of resources and training, relies on the quality and completeness of the provided data.

The future of AI auditing is likely to be more integrative, proactive, and efficient (Gao & Han, 2021). AI is expected to continue its evolution from a detection tool to an analytical partner in decision-making (Jarrahi, 2018). With advances in machine learning and related technologies, AI can adapt to new trends and more sophisticated fraud methods (Ali et al., 2022). In addition, there will be an increased focus on ethical aspects and data security in the use of AI. Lastly, it is expected that there will be increased collaboration between human auditors and AI, where human expertise in contextual judgment and understanding nuances will complement the sophisticated analytical capabilities of AI (Bauer & Estep, 2019).

CONCLUSION

This research has examined in depth the role of Artificial Intelligence (AI) in detecting fraud in accounting audits. The main findings show that AI can improve efficiency, accuracy, and effectiveness in detecting fraud, while offering predictive capabilities not available in traditional methods. The use of techniques such as machine learning, natural language processing, and artificial neural networks have proven their effectiveness in identifying complex fraud patterns. However, this research also reveals challenges, including the limitations of AI technology, ethical and data privacy issues, and barriers to the acceptance of AI in the accounting industry.

The implications of this discovery for the accounting industry are significant. AI is not only revolutionizing the way audits are conducted but also changing the role of auditors, who now require new skills in data analysis and the use of technology. This suggests the need for revision of accounting education curricula to include technological aspects of AI. In addition, accounting firms should consider investing in AI as a long-term strategy to improve audit quality and client service.



For future research, it is recommended to explore the development of more advanced and specific AI models for the accounting industry, with a focus on handling larger and more complex data. Research should also investigate how companies can integrate AI with existing IT infrastructure and how to overcome challenges in its implementation. In addition, there is a need for further research into the ethical and social impact of AI in accounting, including ways to ensure transparency and accountability in decisions made by AI systems.

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