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Current and Future Applications of Artificial Intelligence Techniques in the Audit Profession
A Case Study of the Big Four Audit Firms

Nassira Boubaya [1]

Abstract

The aim of this study is to highlight the current and future applications of Artificial Intelligence Techniques in the Auditing Profession by providing an overview of how the branches of artificial intelligence are used in the profession, while highlighting how Artificial Intelligence Techniques change audits in the future, based on the analytical descriptive approach and the case study method when presenting the uses of the Bigest Four auditing firms of Artificial Intelligence Techniques in Auditing, The results of the study showed that branches of Artificial Intelligence help simplify audit tasks and reduce their costs and make them more efficient, accurate and comprehensive while reducing the time taken to perform them, which gives auditors more time to participate in the analytical part of the process and provide consulting services that help the client make better decisions, And that there is an extensive use of Artificial Intelligence Techniques by the Big Four Auditing Firms due to the advantages and opportunities that Artificial Intelligence presents for the future of the profession, and that auditors will not be replaced by Artificial Intelligence because there is a constant need for human intelligence to operate the technology, and to interpret and analyze the data captured by Artificial Intelligence techniques, The study concluded with a number of recommendations, including the need for the supervisors of the profession to set international auditing standards that control how to use Artificial Intelligence in the profession, and to determine the qualifications and skills of auditors in light of its use.

Keywords: Audit Profession, Artificial Intelligence, Artificial Intelligence Techniques, Big Four Audit Firms

Affiliation of Author
[1] College of Economic, Commercial and Management Sciences, University of Abdelhamid Mehri Constantine 2, Laboratory of Marketing Studies and Research, Algeria, Constantine, 25000
[1] nassira.boubaya@univ-constantine2.dz

[1] Corresponding Author

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التطبيقات الحالية والمستقبلية لتقنيات الذكاء الاصطناعي في مهنة التدقيق
دراسة حالة شركات التدقيق الأربع الكبرى

نصيرة بوبعاية [1]

الخلاصة

تهدف هذه الدراسة إلى تسليط الضوء على التطبيقات الحالية والمستقبلية لتقنيات الذكاء الاصطناعي في مهنة التدقيق من خلال تقديم لمحة عامة حول الذكاء الاصطناعي وفروعه وكيفية استخدامها في المهنة، مع إبراز طريقة تغيير تقنيات الذكاء الاصطناعي لعمليات التدقيق مستقبلا، وهذا بالاعتماد على المنهج الوصفي التحليلي، وأسلوب دراسة حالة عند عرض استخدامات شركات التدقيق الأربع الكبرى لتقنيات الذكاء الاصطناعي في عمليات التدقيق، وقد أظهرت نتائج الدراسة أن فروع الذكاء الاصطناعي كالتعلم الآلي (ML)، والتعلم العميق (DL)، وأتمتة العمليات الروبوتية (RPA) وغيرها تساعد على تبسيط مهام وعمليات التدقيق وتقليل تكاليفها وجعلها أكثر كفاءة ودقة وشمولية مع تقليل الوقت المستغرق للقيام بها مما يمنح المدققين المزيد من الوقت للمشاركة في الجزء التحليلي من العملية وتقديم الخدمات الاستشارية التي تساعد العميل على اتخاذ قرارات أفضل، وأن هناك استخدام مكثف لتقنيات الذكاء الاصطناعي من قبل شركات التدقيق الأربع الكبرى نظراً للمزايا والفرص التي يقدمها الذكاء الاصطناعي لمستقبل المهنة، وأنه لن يتم استبدال المدققين بالذكاء الاصطناعي لوجود حاجة دائمة للذكاء البشري لأداء وتشغيل التكنولوجيا، وتفسير وتحليل البيانات التي تلتقطها تقنيات الذكاء الاصطناعي، هذا وقد خلصت الدراسة إلى جملة من

انتساب الباحثة
[1] كلية العلوم الاقتصادية التجارية وعلوم التسيير، جامعة عبد الحميد مهري قسنطينة 2، مخبر الدراسات والبحوث التسويقية، الجزائر، قسنطينة، 25000
[1] nassira.boubaya@univ-constantine2.dz

[1] المؤلف المراسل

معلومات البحث
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التوصيات منها ضرورة قيام الجهات المنظمة والمشرفة على المهنة بتدريب وتأهيل المدققين بوضع معايير تدقيق دولية تضبط كيفية استخدام الذكاء الاصطناعي في المهنة، وتحديد مؤهلات ومهارات المدققين في ظل استخدامه.

الكلمات المفتاحية: الذكاء الاصطناعي، تقنيات الذكاء الاصطناعي، مهنة التدقيق، شركات التدقيق الأربع الكبرى

Introduction

In the light of the technological development that the world is witnessing today, the audit profession has begun to move away from traditional service models and has renovated the methods and methodologies of recruitment and skills in order to provide clients with integrated consulting services. The Artificial Intelligence market, according to research by Deloitte and PwC, is expected to exceed 191 billion dollar and 15.7 trillion dollar by 2024 and 2030 respectively. Therefore, the Big Four audit Firms did not lag behind of keeping pace with this development, and this is evident through their initiatives in the field of Artificial Intelligence, where I started to invest heavily in this technology to automate audit processes in the context of enhancing and improving the quality of services provided to clients Continuously covering their needs and aspirations and staying in the forefront, especially in light of the intensification of competition among them, and with new competitors from giant technology companies that provide similar services to theirs. With reference to the role of artificial intelligence in the audit profession, it has proven effective in automating repetitive audit tasks and has enhanced the accuracy, efficiency and effectiveness of accomplishing more tasks with less time and effort, and It enabled auditing firms to identify hidden insights and trends that may affect customer business. Not only is this where Machine Learning (ML) as a branch of artificial intelligence can download, classify, analyse, audit and understand vast amounts of customer accounting data and transactions at 100 % to identify unusual operations such as financial fraud, and accounting errors, for example analyzing a general ledger dataset and identifying outliers or exceptions that indicate fraudulent transactions, In addition, this process helps auditors eliminate sampling risks, obtain more real-time audit evidence, and make better decisions. From the foregoing, the following main question can be asked:

What are the Current and Future Applications of Artificial Intelligence Techniques in the Audit Profession?

To answer the main question, we will try to answer a set of the following sub-questions:

- What is meant by Artificial Intelligence?, and what are its most important branches?
- What are the most important branches of artificial intelligence used in the audit profession?
- How the Big Four Audit Firms Use AI Techniques in Audits?
- How will Artificial Intelligence technologies change the way audits are conducted in the future?

The importance of the Study:

The importance of the study lies in the fact that it examines one of the contemporary issues associated with the auditing profession, namely, the integration of artificial intelligence into the profession, Where the study seeks to contribute to the theoretical enrichment in this subject and

provide a clear vision for auditors on how to apply Artificial Intelligence techniques in the practice of the audit profession, and the importance of these techniques for the future of the profession.

The objectives of the study:

This study aims at the achievement of a main goal of highlighting the importance of Artificial Intelligence Techniques for the future of the Audit Profession. To achieve this goal, several sub-goals will be achieved, the most important of which are:

- Giving an overview of Artificial Intelligence Techniques and its most important branches;
- Highlighting the most important branches of Artificial Intelligence currently used in the Audit Profession;
- Clarifying the current uses of Artificial Intelligence Techniques in the Big Four audit firms;
- Highlighting how Artificial Intelligence Techniques will change the way audits are conducted in the future.

Literature review:

Most of the studies that dealt with the subject of the use of Artificial Intelligence in the audit profession are recent foreign studies coinciding with the beginning of the Big Four firms use of Artificial Intelligence in providing their services, but the most important and closest to the subject of the study is a:

- study **Kamil Omoteso** [1] entitled with: **The Application of Artificial Intelligence in Auditing: Looking back to the future.** It aimed at reviewing major research and current discussions on the use of artificial intelligence systems by auditors, with a view to predicting future directions for the research and programme development in the Auditing Profession, By compiling previous studies, the study found a research vacuum that future studies could fill in this area, for example, assessment of the impact of Artificial Intelligence on the design and control of internal control systems, the effects of the use of Artificial Intelligence Systems on small and medium-sized audit firms and on auditors' education and training curricula, and the independence, qualifications and skills of auditors;
- studying **Saleh Mohammed Al-Sayyed, et al** [2] entitled: **The effect of Artificial Intelligence technologies on audit evidence** It aimed at examining the impact of Artificial Intelligence techniques on audit evidence from the point of view of certified auditors in Information technology companies (IT) in Jordan, and it was relied on distributing a structured questionnaire to obtain the necessary information for the present study, and the results of the study showed that expert systems have a significant impact on Audit evidence, while neural network technology had no effect on it, the study recommended the need to increase interest in Artificial Intelligence techniques by audit offices operating in Jordan because of their importance in improving the process of collecting audit evidence;
- studying **Anastassia Fedyk, et al** [3] entitled with: **Is Artificial Intelligence Making Audit Firms More Efficient?** It had been found that investing in Artificial Intelligence helps improve audit quality, and reduce audit fees and the number of auditors by up to 3.6 % after three years, and 7.1 % after four years;
- studying **Shyamala Dhoraisingam, et al** [4] entitled with: **Use of Artificial Intelligence (AI) on Accounting Transactions to Enhance Audit**

Quality which searched in investigated the impact of using Artificial Intelligence (AI) on auditing companies, and concluded that the use of Artificial Intelligence improves the quality of auditing, and that it does not replace the function of auditor, but changes the skill requirements that auditors must have.

By presenting these studies, we point out that the current study is complementary to the previous studies and agrees with them in its main topic and general objective, but it differs from it in its attempt to review the current uses of Artificial Intelligence by Big Four audit firms in the Audit Profession, with reference to the future of the profession in light of the use of this Modern Technology.

Study Methodology and Tools Used:

To achieve the objectives of the present study, a descriptive analytical approach was adopted when presenting various definitions and concepts related to the topic such as the concept of Artificial Intelligence (AI), Machine Learning (ML), Deep Learning (DL), Robotic Process Automation (RPA), Audit Profession, ... and others. Among the concepts that help understand the subject better, with an explanation of how to use the branches of the Artificial Intelligence in the Audit Profession, The method of a case study was also relied upon when presenting the uses of the Big Four Audit Firms for Artificial Intelligence Techniques in auditing operations. As for the tools used, a group of books, magazines, and reports were reviewed, as well as official websites on the Internet to find some solutions to the study of the meant problem.

1. Theoretical Framework of the Study

The emergence and development of the auditing profession is the result of the urgent need to provide control by owners over those who collect their money and store their resources, the audit did not appear until after the emergence of accounting. The origin of the word audit is derived from the Latin word "Audire" which means "to listen" In the beginning, the auditing process was done by listening to the accounts that the accountant read in order to verify them, as Investigators in Rome listened to taxpayers such as farmers when they made public statements regarding the results of their business and the tax fees due, and over time scrutiny evolved as a result of the evolution of its objectives, as well as major developments in the global trade in general and the economic institution in particular.

1.1. Definition of the Audit Profession

There are many definitions provided for the audit profession, among which we mention that the audit profession is "an independent external activity that aims to express an opinion on the compatibility of financial statements with accounting rules and regulations, and that these financial statements give a real and honest picture of reality"[5] In another definition, it is "an examination by an independent qualified professional to express an opinion on the regularity and reliability of the budget and schedule of results accounts for an enterprise". [6]

Based on the foregoing, the audit profession can be defined as an independent and reliable external activity carried out by a person qualified to obtain evidence from financial information to express his opinion on the extent to which the information and financial statements comply with accounting rules

and principles and her expression on the financial position of the organization. The importance of Auditing is:(1)

- The audit ensures that institutions comply with financial policies and represent their financial position fairly and accurately;
- Ensure that financial statements are prepared in accordance with auditing standards such as International Financial Reporting Standards (IFRS) or Generally Accepted Accounting Principles (GAAP);
- Audit helps develop information that benefits shareholders, creditors, government agencies, customers, suppliers, and partners;
- The audit process ensures that those concerned obtain accurate and financial statements free of counterfeiting, so that the regulations and standards of the audit are prohibited the company from falsifying its financial position in order to appear more profitable or successful than it actually is.

The audit process is carried out in accordance with the requirements stipulated in the auditing standards and includes obtaining sufficient and appropriate evidence regarding balances and disclosures in the financial statements to provide a certain level of assurance to users of the financial statements on their reliability and quality, and She's also helps to report significant weaknesses in internal control systems, and to detect fraud and errors for which potential losses may exceed the cost of scrutiny.

1.2. The Concept of Artificial Intelligence

Artificial Intelligence (AI) can be defined as "the ability of a computer-controlled robot to perform tasks performed by a human being. The term is frequently applied to the project of developing systems that have the intellectual processes characteristic of a human being. Such as the ability to think, discover meaning, generalize, or learn from past experiences"(2), in another definition "Artificial Intelligence refers to machines that perform tasks that require some kind of "intelligence", which usually refers to learning, knowing, sensing, thinking, creating and achieving goals Recent advances in Artificial Intelligence are based on technologies such as Machine Learning and Deep Learning, in which algorithms learn how to perform tasks such as classifying things or predicting values through statistical analysis of large amounts of data".[7]

Accordingly, Artificial Intelligence can be defined as referring to machines and robots that simulate human intelligence in performing tasks such as categorizing things, predicting values by analyzing huge amounts of data. Artificial Intelligence has several branches that are used in many fields, and we will explain the most important of these to the Auditing Profession through the followings:

- **Machine Learning:** Machine learning (ML) focuses on building applications and devices that learn from data and improve their predictability and performance automatically through experiments and data without being programmed by humans to do so[8], eliminates the need for millions of lines of written code. Machine Learning consists of both supervised learning (using labeled data sets) and unsupervised learning (using unlabeled data sets);(3)
- **Deep learning:** Deep learning is a type of machine learning that manages inputs through the structure of a neural network, where neural networks contain a number of hidden layers through which data are processed, allowing the

machine to learn in depth, make connections and weigh inputs to obtain the best results(3), in another definition is Computational models consisting of multiple processing layers capable of solving complex systems by learning from simple analytics. Deep Learning (DL) has two main advantages:

- The ability to learn and represent Big Data structures, and learn proper analytics using algorithms;
- Deep learning (DL) allows the system to learn data from deep learning, and increasingly many layers are being used to learn the meaning of analytics;[9]

- Robotic Process Automation: Robotic Process Automation (RPA) refers to the process of assigning manual and repetitive tasks to robots instead of humans, that is, integrating human actions into digital systems to implement and simplify operations, One of the most widespread (RPA) applications in the field of finance, collecting statistics and data, managing regulatory compliance, communicating and marketing through emails, chatbots, and managing business processes;(4)

- Natural Language Processing: This technology (NLP) enables computers to process, understand and use human language, and its most obvious manifestations are voice recognition technology, sentiment analysis and extracted text analysis for a variety of applications.[10] Current methods of an NLP are based on machine learning;(5)

- Robots: This field of engineering focuses on the design and manufacture of robots, and robots are often used to perform tasks that are difficult for humans to perform or perform continuously, for example, robots are used in assembly lines to produce cars, or by "NASA" to transport large objects into space, and self-driving cars that it uses a combination of computer vision, image recognition and deep learning to build robotic skill in driving vehicles.(5)

With the emergence of artificial intelligence and automation techniques, the audit profession has become at a crossroads due to the change in the way auditors work, such as automating the process of downloading documents, understanding and classifying inputs using algorithms, and enabling auditors to accomplish more tasks by using fewer resources, which saved more time and effort to put touches creative in analyzing and interpreting data to extract value from it.

2. The Applications of Artificial Intelligence Techniques in the Audit Profession

The use of Artificial Intelligence provides an analysis of accounting transaction data to identify outliers that usually indicate errors, fraud and thus help auditors perform many time-consuming tasks more efficiently. The following are some of the areas of the use of the Artificial Intelligence branches in the audit profession:

2.1. Machine Learning (ML)

This technology extracts ideas from data by using algorithms that allow machines to learn and improve themselves automatically in a very short time. Machine learning is used by auditors in analyzing data and accounting transactions up to 100 % to create correlations, make predictions, and detect deviations and outliers that indicate for errors, fraud as well as timely identification of emerging risks.(6) The system with Machine Learning capabilities can collect data from different monitoring systems to be used as supplementary evidence alongside traditional audit evidence.(7) As for applying machine learning from

a business perspective, it can be used in data mining to increase revenue, respond to emerging trends, and improve operational efficiency, helping to achieve competitive advantages;[8]

2.2. Deep Learning (DL)

A Deep Learning machine constantly integrates new information and learns from experience to enhance its ability to perform tasks, draw conclusions, and run more scenarios and tests, thereby improving its performance and effectiveness.[9] Deep Learning is used in the audit profession in analyzing unstructured data such as emails, social media posts, audio files of calls etc for additional clues.[10] In the near future, a Deep Learning system will allow auditors to automate many tasks that were traditionally done manually such as checking inventories, handling paperwork, reviewing contracts, and drafting audit reports;[11]

2.3. Robotic Process Automation (RPA)

Robotic Process Automation (RPA) eliminates some of the time-consuming routine manual tasks such as analyzing transaction data, account fluctuations[8], Adjustments, internal control testing and detailed testing, collecting all company data including the results of previous audits, examining and analyzing them to identify outliers that indicate errors and suspicious processes, and as a result auditors will be able to allocate more resources to audit areas of complex nature eg estimating fair value of investments, investigation of items where there are discrepancies.[12]

The automation enabled by (RPA) improves the quality of audits and reduces unintended human input errors (input validation), and when errors occur they are detected and corrected more quickly Due to the systematic and automated nature of the automation process, (RPA) tracks progress against audit plans Not only that, technology can perform simple rule-based audit tasks at more than 90 % speed of what an auditor can do, and fill out audit and management committee reports, cards Balanced performance of internal audit, Sending basic e-mails for follow-up … etc. all of which leads to a reduction in time-consuming manual activities, significant savings in audit costs and the transfer of these savings to clients as reduced audit fees helping the audit firm to remain competitive;[13]

2.4. Natural Language Processing (NLP)

An NLP programs are used in proofreading to help machines analyze and understand the structure and meaning of sentences. In the future, it is expected that NLP will be implemented in many areas of Audit and increasingly[8], this by combining NLP and machine learning techniques, auditors can scan and analyze vast amounts of text such as emails, contracts and social media posts with unprecedented speed to identify discrepancies that typically indicate fraud and illegal activities.[6] Then, the auditors validate the results obtained on the basis of which an insight into the performance of the client can be obtained and which helped them to provide better audit services;

2.5. Robots

Drones are used to collect massive amounts of data from hard-to-reach places for auditors, which are then deployed among audit teams to examine assets, take stock, monitor the environmental impact of a company's activities, or in a 3D representation of designated areas.[14]

Based on the above, it can be said that the use of Artificial Intelligence and its branches in audit tasks has a major role in pushing the profession forward, as the increasing maturity of Artificial Intelligence Techniques in the Audit Profession which provides unlimited possibilities for their application, not only that, as automation relieves auditors from traditional repetitive tasks that require significant time to perform and allow them to focus more on analytical processes, provide advisory services, and professional judgments that help the client make better decisions.

3. The current and future uses of Artificial Intelligence Techniques in the Big Four Audit Firms

In order to know the Artificial Intelligence techniques used in the audit profession, we have collected information about the most important techniques used by the leading auditing companies known as the "Big Four", and these companies include Deloitte, Ernst & Young (EY), KPMG, and Price waterhouse Coopers (PwC) As for the most important services provided by these companies to private and governmental companies, they include audit services, insurance and financial advisory, risk management, legal and tax services, and others.

Recently, audit companies have adopted a new approach for providing their services, which is the integration of Artificial Intelligence technologies into audit tasks and operations. KPMG announced in 2019 that it will allocate 5 billion dollar for a period of five years in advanced technologies such as artificial intelligence, as this announcement is based on a strategic decision to make automation and Artificial Intelligence two elements essential to its future. (PwC) has also announced a program to spend 3 billion dollar over the next four years primarily to train its employees to exploit new technology to address the skills gap, while (EY) will make a two-year investment of 1 billion dollar, while Deloitte is striving to become one of the largest providers of automation solutions for businesses. Although the Big Four Firms have not yet become technology companies, technology remains the core of their future due to the importance of analytics, Artificial Intelligence and Machine Learning in increasing the quality of services they provide to customers.(15)

3.1. The Big four Audit Firms' uses of Artificial Intelligence

Big Four Audit Firms are incorporating innovative technologies including advanced analytics and Artificial Intelligence into audits in order to improve the quality and efficiency of services they provide to clients and create a competitive advantage. To this day, they are still expanding their range of Machine Learning projects, with expectations that 30 % of corporate audits will be performed by Machine Learning and Artificial Intelligence Systems in 2025. Below are some of the AI technologies, software, and tools used by the Big Four Audit Firms:

3.1.1. Deloitte: Deloitte uses many Artificial Intelligence-based platforms, tools and software, and these tools cover all of the company's audit work, and they are accelerating the process of transforming traditional audit services into smart digital services. Among the tools that Deloitte uses in its business are:

- **Deloitte AI Robot:** This software automates audit procedures through data mining and

processing. The software is applied to data on lease contracts, loan agreements, asset management contracts, and financial data. "Deloitte AI Robot" has helped Deloitte reduce document review time by more than 90 % In addition, the program inquires about risks related to the audited institutions based on the list of suppliers and customers and searches it automatically in its databases. "Deloitte AI Robot" saves labor cost by 100 % and improves query time and processing process by 86 %. Moreover, the software is applied to broad scope in financial operations such as invoice printing and processing, automatic stamping and sorting, answering questions, engaging in conversations about audits, accounting standards, tax knowledge, and financial terminology and acronyms To help auditors gain a full understanding of accounting knowledge and auditing in their day work. While the "STOP1" smart inventory tool included in "Deloitte AI Robot 3.0" with its drones provide a comprehensive, intelligent and integrated inventory service by collecting and analyzing results for real-time and remote physical enumeration, "STOP1" reduces labor cost, and the time take inventory, and subsequent arrangements by 30 %;(16)

- **Deloitte Auvenir:** The "Auvenir" platform integrates company audits and provides other services such as project management, client collaboration, data analysis and information security management;

- **Deloitte Cobalt:** The platform uses Artificial Intelligence to perform a comprehensive and intelligent sensing of the financial, operational and reputational risks of the company being audited;

- **Deloitte Coinia:** This platform validates various digital information present in the cloud such as smart contracts stored on Blockchains which enhances Deloitte's ability to audit Blockchain applications;

- **iCredit:** The "iCredit" smart credit risk monitoring platform integrates its extensive experience in auditing credit assets for the financial sector especially large commercial banks, where the platform performs a 100 % complete credit review instead of selective sampling, allowing audit teams to focus on areas that involve risk high, and help them give early warnings about it to management;(17)

- **Deloitte Report Wizard:** This platform reviews reports and makes notes automatically, which speeds up the process and improves its efficiency;(18)

- **Argus/ Optix/ Signal:** These applications use machine learning techniques to identify and extract key financial data from electronic documents. They are also used to analyze all data and transactions to identify potential risks instead of the traditional sampling method;[11]

- **BrainSpace:** is a self-learning tool used to assist in legal cases that relies on machine learning and cluster analysis to search unstructured data to determine what can be used as evidence to support a client's defense.[12] According to Deloitte, artificial intelligence technology has helped the company reduce the time it takes to proofread documents Legal Contracts Documents, invoices, financial statements and minutes of board meetings with a percentage of more than 50 %.(19)

3.1.2. Price waterhouse coopers: (PwC) estimates that 45 % of audit work "core recurring business" can be automated through (RPA) technology, saving 2 trillion dollar in the global

workforce[13], among AI-based technologies (PwC) uses in the audit process the following:

- AI Audit for Cash: Cash audit is an essential component of every audit, but it includes a large number of manual activities that take a long time, so (PwC) uses "AI Audit for Cash" to effectively conduct a comprehensive audit of cash, technology covers Several areas of review of cash balances, bank reconciliations, bank confirmations, currency exchange rate, financial position;[20]

- GL.ai: The app uses Artificial Intelligence and machine learning to upload, scan and analyze documents, transactions and data to detect differences and anomalies that indicate potential error or fraud, improving audit quality and enhancing customer service;[21]

- Halo: It is a technical platform for auditing customer data where it checks millions of entries in a moment in time with any exceptions being flagged immediately. In the first stage, customer data is extracted and updated and entered into the platform, then the platform discovers patterns and trends, after which the data is stored securely in the server, what distinguishes the "Halo" platform is that it takes a fraction of the time compared to before, and it improves the quality of testing, and allowing customers to access the data on the system, helping them reduce costs by 20 %;[13]

- Aura: The "Aura" platform is used to capture and integrate audit activities into a single source of information on audits, "Aura" simplifies the audit testing process by using AI to perform primary analytics, validate and understand data, perform risk analysis, and identify and level risks to the business, The audit teams then assess and confirm the risks identified by "Aura".[22] What distinguishes the "Aura" platform is ensuring that all auditors work with the same methodology and facilitating centralized monitoring in real time which leads to improvements in audit quality[14], in addition to saving time, reducing cost and being able to be used jointly by the audit team and from different locations at any time;

- Connect: It is a dashboard for the internal use of the client and (PwC) auditors that enables them to track and share information and statuses in real time during each stage of the audit process, and to notify the company team of key events, what distinguishes the "connect" platform as a tool for joint work and characterized by speed and provision Security of information on the Internet when audit teams request access to audit documents, and joint dates and events for all audit team shall be determined on her;[14]

- Cognitiv: "Cognitiv" automatically reviews documents at scale, extracts key information, and creates a clear summary that can be exported into Excel table structured, searchable in it, and relied upon to compare new documents against the approved document database to identify differences and changes in patterns that indicate critical problems For example, the software can help detect changes in billing patterns based on past records.[23]

3.1.3. Ernst & Young: Artificial Intelligence Technologies, especially Machine Learning, have helped (EY) reduce the chances of human error, analyze larger samples of transactions for real-time audit evidence, assess risk and detect fraud. Not only that, it enabled artificial intelligence (EY) has been able to analyze lease contracts and obtain accurate and fast information such as lease start date, amount to be paid, and renewal or termination options, and has audited about 80 % of the contents of a simple lease electronically, and 40 % of the more complex leases such as those

linked In addition to this, (EY) uses drones to monitor inventory, count the number of vehicles in a production plant under audit, and communicate this data directly to the audit platform, allowing auditors to free up more time to focus on areas of risk and advise clients instead of manually inventory count.(19) Among the technologies used by (EY) are:

- **Canvas:** an online platform that connects auditors with their clients and provides real-time monitoring of audits, and real-time reporting of their results to clients and auditors involved in the process;(24)

- **Helix:** It is a global analytic platform available to all audit teams, dealing with data of any size based on the analytical audit approach, the platform analyzes journal entries, income and expenses, receivable and payable activities, inventory movements and records, and assesses risks for the mortgage portfolio for the client, and identify patterns, trends and outliers in the data.(25)

3.1.4. KPMG: KPMG uses Artificial Intelligence in many programs and applications, including:

- **Clara:** a smart audit platform that adopts the latest machine learning and Artificial Intelligence solutions to analyze data and identify patterns and anomalies in data that indicate risks;(26)

- **KPMG Spark:** A platform that uses Artificial Intelligence and machine learning to record and categorize transactions and help auditors and accountants get real-time reports;(27)

- **Ignite AI:** A US-patented portfolio that combines AI and machine learning capabilities that ingest document ingest and optical character recognition to help analyze and decode both structured and unstructured data, automating and enhancing existing solutions so organizations can realize real value from data, and make better decisions.(28)

Accordingly, it can be said that there is an intense competition between the Big Four Auditing Firms, as each of them seeks to attract a large number of clients and increase its profit margins, and this is what made it develop and use modern techniques based on Artificial Intelligence in providing high-quality audit services.

3.2. Future uses of Artificial Intelligence in the audit profession

In addition to the current uses of Artificial Intelligence in the audit profession in the future, there are other uses that will change the way audits are conducted:(7)

- **Sampling:** Currently, most auditors audit organizations manually, and they rely on statistical sampling to review hundreds of documents, but with the help of systems capable of machine learning and deep learning, a whole range of documents can be scanned and reviewed moreover, the systems that process information can identify trends anomalies in the data itself;

- **Automatic Evidence Verification:** Internet of Things (IoT) devices with the ability to sense, detect, and recognize events and people are integrated into many aspects of enterprise functionality, where biometric identifiers can control access to data centers, while software monitors and recognizes Faces and the movement of people within the data center, and log analysts analyze each server's logs to identify violations, for the audit profession the auditor can use the system with machine learning capabilities to collect data from different monitoring systems to use as evidence of performance of tasks, and this data can also serve as an evidence when recording

feedback or issues in the event that systems detect any anomalies in the data collected;

- **Proactively checking control:** The board of directors relies on audit to ensure the quality and credibility of the results produced by the organization's departments. In the future, artificial intelligence-based systems can include automated measurement to improve the predictability of results, and verify that they meet expectations. This approach would create a new form of "proactive control" control check, and the audit would then need to be intervened only if the automated security system detected inconsistencies;

- **Dealing with and using Big Data as evidence:** Auditors usually focus on limited evidence and then rely on their experience to make sure that evidence is correct. On the other hand, machine learning, deep learning, and AI-based systems can quickly use huge amounts of data from text information, images, and recordings audio, contracts, emails, … etc. to extract meaningful information as additional evidence alongside traditional evidence;

- **Intelligent Continuous Audit:** The AI-based continuous control monitoring system can examine entire sets of records and identify control violations, and the level of risk of these violations based on the data being fed, and as new data arrives, the AI system can instantly analyze it and turn it into actionable information. Using algorithms and deep learning for a continuous control monitoring system to reconfigure itself based on the previous set of results. This approach helps ensure controls are optimally designed, configured and implemented with minimal human intervention;

- **Auditors are turning into data scientists:** Although, AI-based systems have the ability to analyze unstructured data, and output data patterns, they need the auditors to enter the correct evaluation parameters, since the auditors are the best at understanding this data so they need to possess the skill sets required to manage data effectively and use data visualization techniques to present findings to stakeholders, and accordingly the role of the auditor will change from a reviewer into a translator of results produced by AI systems;

- **Continuous audit report generation:** Traditional audits generate an audit report with a categorical rating like clean, unclean…etc, but using AI and machine learning systems, auditors can use a predictive model to rank different risks at an appropriate scale which helps in creating a continuous audit report and use it to identify positive or negative trends in the assessed area, so organizations can be more flexible, adapt quickly to changes, and act with integrity;

- **Redefining audit standards:** Audit standards are currently based on traditional audit procedures that include manual verification, sample audit, annual plan audit and others, but with the use of modern technologies included in the audit profession, the standards will need to consider the advantages of Artificial Intelligence Able to provide a high level of confirmation by screening all transactions;

Turning auditors into strategic advisors: Historical data of audit issues and their results carry rich information about how to address a particular issue. When problems and their results and how they are dealt with are recorded by audit teams, the AI-based system can perform textual analysis of historical audit information, Share recommendations about similar problems,

corrective actions are taken, the audit teams can then add intelligent solutions to the findings of the system, thus, helping remediation teams solve the problem faster rather than re-finding a solution.

Accordingly, the power of Artificial Intelligence and its branches is working to make audits more easily and quickly than before, and achieve high-quality results, and the machines in the future will learn from the audit work and apply the intelligence of the auditor, but it will not change the basics of auditing because the need for human judgment and professional skepticism will be always necessary, however, auditors will need to embrace the opportunities and challenges that the use of AI in the profession brings.

Results of the Study

This study has reached a number of conclusions, which are as follows:

- Artificial Intelligence refers to machines that simulate human intelligence in performing tasks such as classifying things and predicting values by analyzing huge amounts of data, and the Major branches of Artificial Intelligence include Machine Learning, Deep Learning, Robotic Process Automation, Natural Language Processing, and Robotics;

- The most important branches of Artificial Intelligence used in the audit profession are:

• **Machine learning (ML)** in analyzing accounting transaction data by up to 100% to identify risks in a timely manner, in creating correlations and making predictions, and in detecting anomalies and outliers that can be used as supplemental evidence of errors, fraud, and thus assisting auditors in performing tasks which takes a long time more efficiently;

• **Deep learning (DL)** in analyzing unstructured data such as emails, social media posts, audio files of calls … etc. for additional evidence, and in automating many manual audit tasks such as checking inventories, reviewing contracts and drafting audit reports;

• **Robotic Process Automation (RPA)** in eliminating some of the time-consuming, routine manual tasks, and in collecting company data including results of past audits, checking and analyzing them to identify outliers that indicate the presence of risks, errors and suspicious processes, and as a result the errors of human input are reduced, allocating more resources to complex audit areas;

• **Natural language processing (NLP)** along with machine learning technology in scanning, analyzing and understanding vast amounts of text, such as e-mails, contracts and social media publications, at an unprecedented speed to identify inconsistencies that usually indicate fraudulent processes and illegal activities, And, then does auditors to validate the results obtained;

• **Robots** using drones to reach hard-to-reach places for auditors, capture huge amounts of data in very short periods of time, and deploy it among audit teams to check assets, take stock or monitor the environmental impact of company activities, and create 3D representations of areas designated.

- The Big Four Firms use artificial intelligence-based techniques, programs, and tools in audits as follows:

• **Deloitte:** It uses "Deloitte AI Robot", which automates audit procedures by extracting and processing data. The program is applied to data on lease contracts, loan agreements, asset management contracts, and financial data. In addition, the program inquires about risks related

to the audited institutions based on supplier and customer list data, the software is widely applied in financial operations such as invoice printing and processing, automatic stamping, sorting, answering questions, participating in conversations about audits, accounting standards, tax knowledge, financial terminology and abbreviations to help auditors gain a full understanding of accounting and audit knowledge in their tasks; While, "Deloitte AI Robot 3.0's" intelligent "STOP1" inventory tool with its accompanying drones provides a comprehensive, integrated inventory service that collects and analyzes results for real-time and remote physical enumeration; While the "Deloitte Auvenir" platform integrates the company's audits and provides other services such as project management, client collaboration, data analysis and information security management; The "Deloitte Cobalt" platform provides a comprehensive and intelligent sensing of the financial, operational and reputational risks of the company being audited; "Deloitte Coinia" validates various digital information in the cloud such as smart contracts stored on block chains, which enhances the ability to audit Blockchain applications; while the "iCredit" smart platform monitors credit risk and integrates our extensive experience in auditing credit assets for the financial sector; In addition to the aforementioned tools, the "Deloitte Report Wizard" platform reviews reports and makes notes automatically; "Argus/ Optix/ Signal" applications to identify and extract key financial data from electronic documents, and are used to analyze all data and transactions to identify potential risks instead of the traditional sampling method; The "BrainSpace" self-learning tool is used in legal cases by looking at data to determine what can be used as an evidence to support a client's defense;

• **Price waterhouse coopers:** use "AI Audit for Cash" to perform a comprehensive cash audit including review of cash balances, bank reconciliations, bank confirmations, currency exchange rate, financial position; apply "GL.ai" to upload, scan and analyze documents, transactions, and data to detect differences and anomalies that indicate potential error or fraud; "Halo" uses it to audit customer data, validating millions of entries, and flagging exceptions in the data; while "Aura" captures and integrates audit activities into a single source of audit information, performs primary analytic, validates and understands data, and performs risk analysis and identification; Whereas, the "Connect" dashboard enables auditors to track and share information and statuses in real time during each stage of the audit process, notifying the corporate team of key events; "Cognitiv" automatically reviews documents, extracts key information, and creates a clear summary that can be exported into Excel table structured, searchable in it, It is relied upon to compare new documents against the approved document database to identify differences and changes in patterns that indicate critical problems;

• **Ernst & Young:** uses the "Canvas" platform that connects auditors with their clients online and provides monitoring and real-time reporting of audit results to the parties involved in the process; While global analytic platform "Helix" analyzes journal entries, income and expenses, accounts receivable and payable activities, inventory movements and records, assesses the risk of a client's mortgage portfolio, and identifies patterns, trends and outliers in the data;

• **KPMG:** "Clara" is used to analyze data and identify patterns and anomalies in data that indicate the presence of risks; "KPMG Spark" transaction logging and classification platform to help auditors obtain real-time reports; "Ignite AI" software is used by the company for document ingestion and optical character recognition to help analyze and decode various types of data, and to automate and enhance existing solutions.

- Artificial Intelligence technologies are changing the way audits are conducted in the future through the following:

• Analyzing and reviewing a full range of documents and transactions and identifying trends and outliers in the data in an automated way rather than a sampling method;

• Auditors use of systems with machine learning capabilities to collect data from different monitoring systems for use as an evidence of task performance, and as an evidence when recording observations or problems in the event the systems detect any anomalies in the collected data;

• Proactively checking control using AI-based systems to improve predictability of results, and verify that they meet expectations;

• Using Machine Learning, Deep Learning, and AI-based systems to rapidly analyze vast amounts of data "Big Data" from text information, images, audio recordings, emails, … etc. to extract meaningful information and consider it as an additional evidence along with the traditional evidence;

• Using Artificial Intelligence in a continuous control monitoring systems, and in creating continuous audit reports to support smart auditing;

• Issuing Auditing Standards for the use of Modern Techniques in the Auditing Profession, in particular Artificial Intelligence Technology;

• Turning Auditors to turn into consultants and analysts of the data and findings of Artificial Intelligence Systems.

Conclusions

In conclusion, it can be said that Artificial Intelligence technology has the full ability to perform all the normal tasks of auditors, but this does not mean that it will replace auditors, as there will always be a need for human intelligence to perform and operate the technology and interpret and analyze data captured by Artificial Intelligence techniques, in addition to Auditors will play an important role in providing better consulting services than machines, so instead of replacing auditors, working together with AI will help auditors perform regular audit tasks in a modern way as AI and Machine Learning perform repetitive tasks more efficiently and effectively, This allows for the provision of time and guid it in focusing on other public functions such as data analysis and consulting services, and then it can be said that Artificial Intelligence will be the future of the audit profession, so it requires auditors to possess the appropriate skills, infrastructure, process, and culture for the success of the transition towards Artificial Intelligence.

Recommendations

Through all of the above, we recommend the followings:

- Increasing interest in Artificial Intelligence technology by auditors, auditing companies and offices because of its importance in improving the quality of audits;

- That the regulators and supervisors of the profession train and qualify auditors by setting international auditing standards that control how

Artificial Intelligence is used in the profession, and determine the qualifications and skills of auditors in the light of its use;

- Auditors to understand common markup languages, implement models and cloud services to properly perform audit work and facilitate the shift towards the use of AI technology in the profession;

- The auditors to understand the risks and challenges associated with the use of artificial intelligence and its branches in auditing processes to ensure its successful application;

- Establishing clear legal and ethical standards and rules and governance models on privacy and data management, Cyber Security, risk management and algorithmic bias in the light of the use of Artificial Intelligence and this to protect auditors and their clients.

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