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THE ROLE OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN ENHANCING PREDICTIVE ABILITY OF FINANCIAL STATEMENTS: BIG DATA AS AN INTERACTIVE VARIABLE

ABSTRACT

The research aims to study and analyze the role of adopting artificial intelligence technologies in supporting the predictive ability of financial statements in the context of big data. To achieve the research objective, the researchers designed a questionnaire that included three axes related to the research variables. It was distributed electronically to a sample of accountants, auditors, and investors in the Iraq Stock Exchange. Around 70 responses were collected from the sample members and relied upon in the practical aspect of the research. The SPSS statistical program was used to analyze the results. The research found that artificial intelligence technologies have a statistically significant effect in improving the predictive value of accounting information, and this effect increases in light of big data. Among the most important recommendations of the research is the necessity for financial analysts and investors to use artificial intelligence technologies because it contributes to the accuracy and speed of conducting analyses and comparisons that help improve the predictive value of information, as well as the necessity of employing and adopting big data analytics and capabilities due to the rapid and accurate data processing it provides.

Keywords: Artificial Intelligence Technologies, AI, Predictive Ability of Financial Statements, Big Data

JEL Classification: G15, M21, M41

INTRODUCTION

Research on AI and its techniques has received much interest from researchers worldwide. Previous research argued that its techniques play an important role in development. AI techniques represent a set of tools and technologies that AI uses to describe and mimic human intelligence in computer systems. These techniques include various methods and tools that allow computer systems to learn patterns from information and data and are used to predict outcomes. They are used in applications such as machine translation, content analysis, and the design and development of robots that interact with and learn from the environment to understand and analyze human language. AI techniques offer many benefits in different fields. Researchers concluded that AI can help to improve efficiency and productivity because it analyzes the data faster and more accurately than humans. High-quality analyses can enhance decision-making and prediction accuracy, and they reduce costs through improved efficiency and productivity while minimizing human errors (Weigel et al., 2022).

New theories show that accounting data helps predict the future and make key decisions. This is to say that these decisions can be related to investments, financing, planning, strategic direction, and other aspects of business operations. Studies proved that a firm's accounting data reveals insights for forecasting its future performance. This has been widely adopted in analyzing the data because the companies can anticipate future trends and make strategic decisions based on these forecasts. It helps companies to improve financial performance and make strategic decisions based on AI-available data and information (Ranta et al., 2022).

From the researchers' point of view, big data refers to a massive, rapidly growing, and diverse dataset. It consists of three main elements: volume, velocity, and variety.

LITERATURE REVIEW

The Impact of AI on the Predictive Value of Accounting Information in Light of Big Data: A Theoretical Approach

Artificial intelligence (AI)

AI imitates human smarts by grasping context and making wise choices with data. AI is considered synonymous with cognitive technology or cognitive computing, and it has an appropriate level of intelligence to perform cognitive tasks (Rashid and Afram, 2023: 433).

According to a recent study, AI simulates human intelligence processes through computers. The main feature of AI techniques is that they learn from each operational cycle (feedback). This is to say that they improve over time (become more intelligent) through repetition, error correction, and self-improvement (Mach, 2019:2).

Similarly, AI programs make well-rounded decisions by understanding the situation. To do this, they mimic human abilities like recognizing images and reading. Researchers found that the proper functioning of AI requires the system to have high operational value and large amounts of data (Issa et al., 2016).

Currently, there are three levels of AI (Ahmed, 2019):

Weak AI: Currently, AI is able and programmed to perform a single task, whether it's weather data, playing chess, or analyzing raw data. This type of model operates within a predefined scope, such as the cloud or a central computer. However, it is still highly beneficial and represents a step towards building advanced intelligent systems.

Strong AI: These are machines that can successfully perform human intellectual tasks. Machines have become capable of processing data faster than we can, but as humans, we can think abstractly, develop strategies, and use our ideas to make informed decisions or come up with creative ideas, which gives us an advantage over machines in terms of intelligence.

Superintelligence: This is the hypothetical level of AI that is expected to surpass human intelligence in terms of creativity, general wisdom, and effective problem-solving. Many people are worried about this level because it could potentially lead to the extinction of the human race if it exceeds our capabilities. Some people predict that by 2045, we may be able to increase our intelligence by about a billion times through wireless communication between human brains. However, as AI capabilities continue to advance, we can envision a future where the movement of machines and humans makes us more intelligent and aware.

AI is considered one of the technologies of the Fourth Industrial Revolution, along with a set of other technologies that resulted from this revolution, as summarized in Table (1) (Ali, 2023: 24).

Table 1. Technologies of the Fourth Industrial Revolution. *(Source: (Nafi, 2022: 403))*

№	Name of the technique
1	Internet of Things (IoT)
2	Robotics
3	Artificial Intelligence
4	3D Printing
5	Automated Knowledge Systems
6	Social Networks
7	Cloud Computing
8	Cellular Technologies
9	Block Chain
10	Augmented Reality
11	Smart Things
12	Big Data
13	Nano Technology
14	Digital Citizenship

Thus, researchers believe that AI is the result of a phase of escalating development in computer systems and digital processors left by the Fourth Industrial Revolution. It expresses a set of capabilities of a digital computer or robot that can perform tasks commonly associated with smart things in a way similar to the methods followed by humans and may even surpass them sometimes.

Types of AI techniques

AI technologies include a wide range of independent or interactive technologies that are used in various areas of life, namely:

- *Machine Learning*: It deals with improving learning based on AI data through specific algorithms. In other words, the device or program learns to perform certain tasks if it has previously gained experience in the form of appropriate data. Thus, with this data and the completion of each task, the program or device's experience increases (Url, 2021; Ali, 2023);
- *Deep Learning*: Some see it as machine learning on autopilot, allowing computers to learn and choose independently. Additionally, deep learning takes that automation even further (Kumari, 2022: 3). From a similar perspective, deep learning is defined as a set of algorithms that "learn through layers." In other words, learning through layers enables algorithms to create a hierarchical sequence of complex concepts from simpler ones (Wazn, 2022: 13);
- *Neural Networks*: Although neural networks have existed for several decades, their widespread application has only occurred relatively recently. The services that have made artificial neural networks more widely applicable today are increasing computing power, data availability, and what is known as cloud computing. These elements have been combined to enhance their applicability (McAfee & Brynjolfsson, 2017: 12);
- *Neural networks mimic how nerves fire in layered networks in our bodies*. This network "learns" through communication, just like our brain's web of neurons processing information. A neural net basically models how our brain neuron networks think (Kenji, 2013). Moreover, research has divided neural networks into several types: feedforward neural networks, which are the most commonly used; feedback neural networks, either directly or indirectly; and self-organizing neural networks (Bouzidi and AL Chouch, 2017);
- *Expert Systems:* It's an AI type that uses a knowledge bank and sub-programs to make proper decisions for tackling specific issues (Al-Saqa and Rashid, 2012: 112). Expert systems are also defined as computer programs that work to mimic human expertise procedures in solving difficult problems. Al-Qassaimeh concluded that experts' experiences are converted into expert systems so that end-users can benefit from them in solving their problems (Al-Qassainmeh, 2021: 188). In fact, expert systems are important in decision-making areas because they rely on AI tools to identify issues through the knowledge base. The knowledge base develops solution alternatives, evaluates them, and proposes appropriate solutions. Furthermore, expert systems are commonly used in business to provide advice and consulting, but they do not replace the decision-maker (Hamed and Nasib, 2017);
- *Natural Language Processing (NLP):* It is a computer-assisted analytical technique that automatically analyzes and understands human language. It allows scientists to easily extract useful ideas from textual data sets while avoiding tedious computational work (Kang et al., 2020: 139). Thus, it focuses on understanding unstructured data (from human sources) as an application of AI. With this in mind, one of the central problems in AI is communication, and technology works to facilitate communication between people and computers (Fisher et al., 2016: 3).

Through the above, researchers believe that AI techniques are more beneficial when they are integrated and unified. This leads to increased reliance on them in various aspects of the organization, especially if they have the high computing capabilities and other material resources needed to manage these technologies.

The Predictive Ability of Financial Statements

Accounting data matters because it forecasts what's ahead, helping users plan smarter usage of resources and capabilities. Without accurately predicting future trends, stakeholders can't set policies properly. Their decisions, plans, and estimates would be unrealistic. So, accounting's predictive value serves as an early warning about an entity's ability to keep operating or not. It also enables the entity to avoid potential financial challenges in the early stages (Asaad & Safwan, 2022: 151).

Although accounting information is based on past historical events during its preparation, decision-makers rely on it to make future decisions because this information reduces uncertainty and assists them in predicting the future (Younis, 2018: 195).

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Prediction conventionally refers to all activities that involve collecting data and information that demonstrate all potential factors, circumstances, and variables in the future that affect the activities and operations performed by the organization (Ibn Zakaria, 1979: 385).

Information has predictive value if it can be used as input in the mechanisms employed by users of accounting information to predict future outcomes. In other words, this characteristic helps information users predict the expected results of various events or confirms their expectations (IASB, 2018: 12). The more accounting information is distinguished by its ability to provide economic decision-makers with information and help them in achieving their forecasts and reducing decision-making risk, the more valuable it becomes, and the greater the user's need for it.

The predictive value means high-quality financials can forecast the future. Analysts and investors use past data to spot performance trends and predict upcoming profitability. The Financial Accounting Standards Board (FASB) conceptual framework defined predictive value as information that can be used as inputs for the processes users employ to predict results, thus having predictive value (Abdel Halim and Sorour, 2023).

Banica et al. (2012) also noted that prediction accuracy depends on the quantity and sources of data collected, as well as the predictive model used. This involves three steps (Banica et al., 2012):

1. Gathering more historical data and proving each dataset's importance. With enough prior data, predictions become more precise. Crucially, you must identify which elements significantly impact prediction accuracy.
2. Prediction software is used to process the inputs from step one. The focus here is on the data required for prediction and analysis.
3. Selecting the right prediction model, and then evaluating its accuracy. Practical experience guides model choice. The software (charts, reports, etc.) gives managers comprehensive info to assess prediction results.

Big Data's Impact on Business Environment

Big data emerges from new technology and automation. However, that data only becomes valuable once it is turned into useful information. As data piles up, companies must either ignore it or leverage it to gain an edge. Traditional tools won't cut it, though, since studies show big data includes all kinds of data, such as images, audio, and video. So, companies have little choice but to get data analysis tools that can convert all that raw data into added value (Younis, 2020: 91). Big data is defined by three characteristics (Bragazzi et al., 2020):

1. *Velocity:* the unprecedented speed of data acquisition and processing, leading to the term "fast data" for big data.
2. *Volume:* the massive amount of available information.
3. *Variety:* diverse sources's number and channels that can produce and generate big data.

The types of big data include the following (Younis, 2020):

- Structured data: Info neatly stored in database fields you can manage, analyze and search using SQL.
- Unstructured data: Messy stuff like images, videos, PDFs, presentations, emails, tweets, web pages, and chat messages that don't fit into neat categories.
- Semi-structured data: A mix of structured and unstructured, like word processing files without an organized setup.

Big data comes from numerous sources, which can be illustrated in Figure 1.

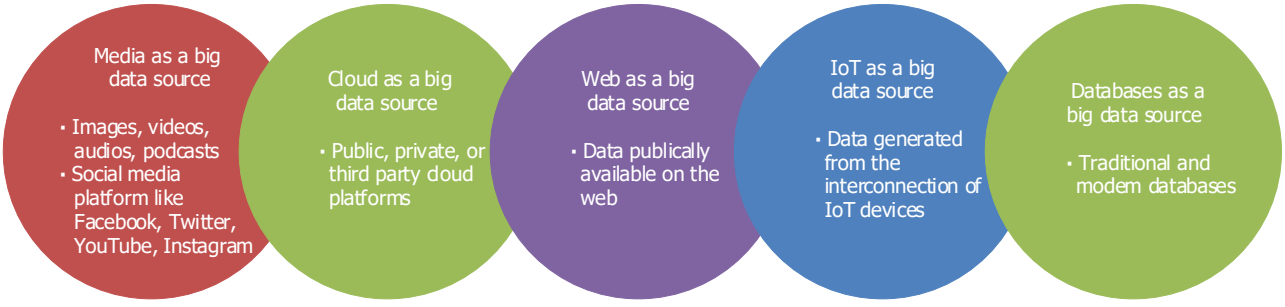

Figure 1. Sources of Big Data. *(Source: Josh, Naveen, (20170, "TOP 5 Sources of Big Data", https://www.allerin.com/blog/top-5-sources-of-big-data))*

The AI mechanism related to big data can provide digital devices and specialized software for analyzing and designing algorithms and machine learning. In general, an AI system can process large amounts of training data (Burns, 2023).

Therefore, the relationship between big data and AI can be considered mutually beneficial. AI techniques mine and analyze big data to extract information and convert it into knowledge that can be subsequently perceived in a timely and cost-effective manner. On the other hand, AI benefits from the same data and information to increase understanding and comprehension, and it can be used as future knowledge because AI learns from big data to enhance awareness and make future predictions (Tayyib and Houcine, 2022).

A study by Gepp et al. (2018) explored how important big data is for accounting and auditing. It enables better data-driven auditing processes and a smoother auditor experience. For taxes, it helps assess codes, curb fraud, monitor budgets, and track expenditures. Plus, big data techniques feed predictive models using decision trees, neural networks, and algorithms - forecasting disruptions, financial failures, fraud, stock movements, and quantitative modelling.

AIMS AND OBJECTIVES

The research aims to study and analyze the role of adopting artificial intelligence technologies in supporting the predictive ability of financial statements in the context of big data.

Research objectives are:

- to explain the perception and elements of AI and its techniques;
- to highlight the predictive value of accounting information and its importance;
- to study the impact of AI techniques in increasing accounting information's predictive value in light of big data.

METHODS

Statement of the Problem

A company's accounting predictive value is a major challenge today as accounting data volume rapidly increases, leading to more risks. Accountants face growing difficulties in effectively analyzing this data to make strategic decisions. In this context, artificial intelligence (AI) techniques and big data analytics can assist in improving the predictive value of accounting information. The study is considered both qualitative and quantitative. AbuHamda et al. (2021, p. 71) stated, "Quantitative and qualitative methods are the engine behind evidence-based outcomes".

Questions:

1. What is the role of AI techniques in the predictive value of accounting information?
2. What is the role of AI techniques in the predictive value of accounting information in light of big data?

Research Significance

This study is significant for two reasons based on the research questions and aims. First, improving accounting information's predictive value is crucial for today's companies and organizations. Second, it helps enhance operational and financial performance and enables data-driven strategic decisions. AI and big data can now boost how well accounting predicts the future.

Hypothesis

1. AI techniques have a significant impact on improving the predictive value of accounting information.
2. AI techniques have a significant impact on improving the predictive value of accounting information in light of big data analytics.

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Research model

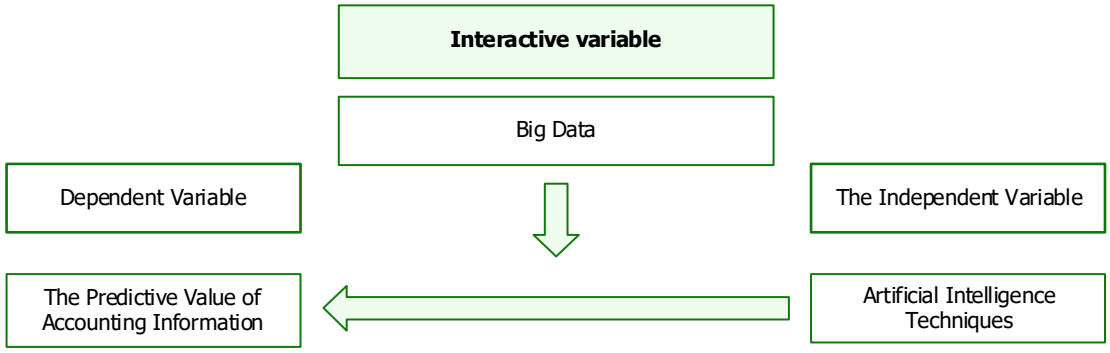

Figure 2. Research Model.

Population

The research population consists of academics, investors, and accountants. A random sample of 100 people was taken for the questionnaire, and their views on its items were surveyed.

The Role of AI in the Predictive Ability of Financial Statements in Light of Big Data: A Practical Approach

Descriptive Statistical Analysis of Study Variables

For this research's practical part, a questionnaire tested the hypotheses and met the objectives. It went to a sample of university professors, accountants, auditors, and investors with 36 questions across three sections. Section one had 14 questions measuring AI techniques. Section two had 10 questions on the predictive value of accounting information. Section three had 12 questions dedicated to measuring big data. Statements used a 1-5 Likert scale from "strongly disagree" to "strongly agree".

The scale's reliability was verified by calculating Cronbach's alpha coefficients and the split-half reliability method using the SPSS software. Table 2 shows high-reliability coefficients for the two resolution axes, and the reliability coefficient for all axes exceeds 70%.

Table 2. Cronbach's Alpha and Split-Half Coefficients for Scale Reliability.

Axes	Cronbach's Alpha	split-half reliability Guttman Spearman-Brown
AI Techniques	78.6%	76.3%
Predictive Value of Accounting Information	84.3%	83.5%
Big Data	83.6%	81.3%
Total	89.7%	87.2%

To check how well each dimension's questions hung together, Pearson correlation coefficients measured internal consistency. Here are the results:

RESULTS

Table 3 shows the correlation coefficients between each dimension and its questions were high, with a direct relationship that was statistically significant since Sig. (2-tailed) was under 0.05. This indicates solid internal consistency between the dimensions and their questions, with each question enriching its respective dimension. After validating the scale, it was distributed electronically, and 70 responses from the questionnaire sample individuals. Here's a description of that sample.

Table 3. Measuring the validity of the questionnaire. Note: **- correlation is significant at the 0.01 level (2-tailed), * - correlation is significant at the 0.05 level (2-tailed).

Correlations														
		X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14
Artificial Intelligence	Pearson Correlation	.69**	.692**	.763**	.660**	.796**	.811**	.793**	.774**	.781**	.578**	.742**	.772**	.635**	.573**
	Sig. (2tAI led)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Predictive Value of Accounting Information	Pearson Correlation	.62**	.627**	.665**	.679**	.688**	.712**	.716**	.727**	.710**	.647**				
	Sig. (2tAI led)	0	0	0	0	0	0	0	0	0	0				
Big Data	Pearson Correlation	.44**	.558**	.541**	.641**	.719**	.833**	.793**	.770**	.711**	.691**	.552**	.461**		
	Sig. (2tAI led)	0	0	0	0	0	0	0	0	0	0	0	0		

Individuals' responses were as follows (Table 4):

Table 4. Description of the individuals in the questionnaire sample.

Information	Divisions	Repetitions	Cumulative Ratio	Ratio
Gender	Female	17	22%	24%
	Male	53	100%	76%
	Total	70		100%
Age	Less than 30	5	7%	7%
	From 31-40	20	36%	29%
	From 41-50	21	66%	30%
	More than 50	24	100%	34%
	Total	**70**		**100%**
Educational achievement	Diploma	6	9%	9%
	Bachelor	22	40%	31%
	Higher Education Diploma	12	57%	17%
	Master's degree or equivalent	16	80%	23%
	Doctorate degree or equivalent	14	100%	20%
	Total	**70**		**100%**
Job title	Academic	15	21%	21%
	Investor	26	59%	37%
	Accountant	16	81%	23%
	Auditor	13	100%	19%
	Total	**70**		**100%**
Years of Experience	Less than 50 years	9	13%	13%
	From 5 to 10 years	15	34%	21%
	From 11 to 15 years	24	69%	34%
	From 16 to 20 years	12	86%	17%
	More than 21 years	10	100%	14%
	Total	**70**		**100%**

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AI Techniques

It is noted from Table 5 that the arithmetic mean for the axis as a whole is 4.122, which is greater than the default mean for the scale of 3 degrees and with a very low standard deviation of 0.525, while the degree of the coefficient of variation was 0.127. This indicates the strong convergence of the opinions of the individuals in the questionnaire sample about the items.

Table 5. Responses of the Sample to the Items of the AI Techniques Axis. Note: F – Frequency, P – Percentage.

Questions	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree		Mean	Standard Deviation	CoV	Importance Rank
	F	P	F	P	F	P	F	P	F	P				
1. Expert systems, as one of the artificial intelligence techniques, represent a type of intelligent software that relies on knowledge rules and logic to make decisions.	37	53%	30	43%	3	4%	0	0%	0	0%	4.486	0.583	0.13	1
2. Expert systems technology aims to reduce reliance on humans in making decisions in certain areas.	37	53%	30	43%	3	4%	0	0%	0	0%	4.486	0.583	0.13	2
3. Expert systems are characterized by their value in analyzing data and information quickly and accurately and providing innovative recommendations and solutions.	34	49%	33	47%	3	4%	0	0%	0	0%	4.443	0.581	0.131	3
4. Neural networks, as one of the artificial intelligence techniques, represent mathematical models inspired by the human brain.	31	44%	32	46%	4	6%	1	1%	2	3%	4.271	0.867	0.203	11
5. Neural networks consist of small units called nodes that work together to process data, discover patterns, and make decisions.	24	34%	32	46%	13	19%	0	0%	1	1%	4.114	0.808	0.196	9
6. Knowledge representation and reasoning as one of the techniques of artificial intelligence concerns how knowledge and information are represented and used to make decisions and reasoning.	22	31%	32	46%	15	21%	0	0%	1	1%	4.057	0.814	0.201	10
7. Knowledge representation works to transform knowledge and information into a form that the artificial intelligence system can understand and use.	20	29%	31	44%	18	26%	1	1%	0	0%	4	0.78	0.195	8
8. Reasoning works in using knowledge and represented information to make decisions and conclusions.	18	26%	33	47%	16	23%	3	4%	0	0%	3.943	0.814	0.207	13
9. Machine learning, as one of the artificial intelligence techniques, focuses on developing models and systems that learn from data and improve their performance over time without the need for repeated manual programming.	13	19%	33	47%	20	29%	4	6%	0	0%	3.786	0.815	0.215	14
10. Machine learning relies on available data and information to analyze patterns, and forecasts, and make decisions.	13	19%	41	59%	15	21%	0	0%	1	1%	3.929	0.729	0.185	7
11. Deep learning, as one of the artificial intelligence techniques, uses artificial neural networks to analyze data, discover patterns, and make decisions.	18	26%	37	53%	15	21%	0	0%	0	0%	4.043	0.69	0.171	6
12. Deep learning relies on artificial neural networks that consist of multiple layers that learn from data gradually and improve their performance over time.	17	24%	38	54%	15	21%	0	0%	0	0%	4.029	0.68	0.169	5
13. Automatic learning, as an artificial intelligence technology, uses data to train models and improve their performance automatically without human intervention.	17	24%	40	57%	11	16%	0	0%	2	3%	4	0.816	0.204	12
14. Automatic learning relies on available data and information to analyze patterns, and forecasts, and make decisions.	19	27%	41	59%	10	14%	0	0%	0	0%	4.129	0.635	0.154	4
Arithmetic Mean, Standard Deviation, and Ranking of Importance for the AI Axis											4.122	0.525	0.127	2

It is noted from Table 5 that the arithmetic mean for the axis as a whole is 4.122, which is greater than the default mean for the scale of 3 degrees and with a very low standard deviation of 0.525, while the degree of the coefficient of variation was 0.127. This indicates the strong convergence of the opinions of the individuals in the questionnaire sample about the items.

The predictive value of accounting information

It is noted from Table 6 that the weighted arithmetic mean for the axis as a whole is 3.924, which is greater than the default mean for the scale of 3 degrees, and with a very low standard deviation of 0.562, while the degree of the coefficient of variation was 0.143. This indicates the strong convergence of the opinions of the individuals in the questionnaire sample about the items.

Table 6. Response of the questionnaire sample to the items on the predictive value of accounting information. Note: F – Frequency, P – Percentage.

Questions	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree		Mean	Standard Deviation	Variance Coefficient	Ranking of Importance
	F	P	F	P	F	P	F	P	F	P				
1. The predictive value of accounting information means the value of using accounting information to anticipate future events and make strategic decisions	19	27%	40	57%	11	16%	0	0%	0	0%	4.114	0.649	0.158	1
2. Accounting information helps improve the company's administrative decisions because it is the most important source that managers rely on in making decisions	17	24%	41	59%	11	16%	1	1%	0	0%	4.057	0.679	0.167	2
3. Accounting information can be relied upon to determine future policies and procedures to improve financial performance.	17	24%	40	57%	11	16%	1	1%	1	1%	4.014	0.771	0.192	3
4. 4Accounting information improves the added value of the company by identifying future economic and financial trends.	15	21%	40	57%	11	16%	2	3%	2	3%	3.914	0.864	0.221	5
5. Accounting information can be relied upon to improve the value of predicting the future of the company and determining future investments and projects.	17	24%	34	49%	16	23%	1	1%	2	3%	3.9	0.887	0.227	6
6. Accounting information contributes to improving the effectiveness and efficiency of the company's internal operations	15	21%	34	49%	18	26%	1	1%	2	3%	3.843	0.879	0.229	7
7. Accounting information helps improve transparency and accountability within the organization	17	24%	32	46%	20	29%	1	1%	0	0%	3.929	0.767	0.195	4
8. Accounting information can contribute to improving relationships with external parties such as investors, suppliers, and customers	16	23%	32	46%	18	26%	3	4%	1	1%	3.843	0.879	0.229	8
9. Accounting information can help improve value by adapting to external changes such as economic fluctuations and new legislation	17	24%	31	44%	17	24%	3	4%	2	3%	3.829	0.947	0.247	10
10. Accounting information can help improve value by adapting to external changes such as economic fluctuations and new legislation	15	21%	33	47%	17	24%	3	4%	2	3%	3.8	0.926	0.244	9
Arithmetic Mean, Standard Deviation, and Ranking of Importance for the Axis of Predictive Value of Accounting Information											3.924	0.562	0.143	3

Big Data

Table 7 shows the overall dimension's mean was 3.799, above the scale's neutral 3, with a very low standard deviation of 0.444 and a coefficient of variation at 0.117. This strong agreement among respondents indicates their opinions converged tightly around the items.

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Table 7. Responses of the Survey Sample Individuals to the Items of the Big Data Axis. Note: F – Frequency, P – Percentage.

Questions	Strongly Agree		Agree		Neutral		Strongly Disagree		Strongly Disagree		Arith-metic Mean	Standard Deviation	Variance Coeffi-cient	Ranking of Im-portance
	F	P	F	P	F	P	F	P	F	P				
1. The term big data refers to a very large collection of data that is difficult to store and process using conventional tools available.	12	17%	37	53%	16	23%	3	4%	2	3%	3.771	0.887	0.235	12
2. Big data is characterized by the speed of its generation and updating. Data can be collected from multiple sources and is quickly updated, which requires value to be processed very quickly.	14	20%	34	49%	19	27%	2	3%	1	1%	3.829	0.834	0.218	11
3. Big data is characterized by its diversity and includes data of various forms and types, such as textual, image, video, and other data.	13	19%	40	57%	15	21%	2	3%	0	0%	3.914	0.717	0.183	8
4. Big data helps analyze financial data better and faster, which helps in making the right financial decisions.	8	11%	42	60%	19	27%	1	1%	0	0%	3.814	0.644	0.169	4
5. Big data is used to improve accounting processes, such as billing, collection, and inventory management.	8	11%	43	61%	18	26%	1	1%	0	0%	3.829	0.636	0.166	2
6. Big data can be adapted to analyze tax data effectively, allowing the taxes owed to be determined more accurately.	10	14%	40	57%	20	29%	0	0%	0	0%	3.857	0.643	0.167	3
7. Big data is used to analyze the company's operations and activities, which helps improve the company's operational processes.	7	10%	42	60%	21	30%	0	0%	0	0%	3.8	0.604	0.159	1
8. Big data is used to analyze market indicators, which helps identify growth opportunities and improve marketing strategies.	9	13%	37	53%	24	34%	0	0%	0	0%	3.786	0.657	0.174	6
9. Big data can be used to analyze social data, which helps identify customer needs and improve customer service.	8	11%	37	53%	25	36%	0	0%	0	0%	3.757	0.647	0.172	5
10. Big data is used to analyze environmental data, which helps determine the environmental impacts of business activities and promote sustainability.	8	11%	39	56%	22	31%	1	1%	0	0%	3.771	0.663	0.176	7
11. Big data is used to analyze information security, which helps identify security threats and improve the reliability of financial reports.	9	13%	36	51%	22	31%	2	3%	1	1%	3.714	0.783	0.211	10
12. Big data is used to better analyze financial and accounting data, which contributes to improving the company's financial and accounting performance.	7	10%	42	60%	18	26%	2	3%	1	1%	3.743	0.736	0.197	9
Arithmetic Mean, Standard Deviation, and Ranking of Importance for the Big Data Axis											3.799	0.444	0.117	1

Results of Hypothesis

For testing the first hypothesis, the researcher used this quotation:

$$PV_t = B_0 + B_1 AIT_t + \varepsilon_{it} \quad (1)$$

where: PV *Dependent variable (predictive value of accounting information);* AIT *= Independent variable (AI techniques);* B_0 *= Regression equation constant, representing the value of the dependent variable when the independent variable is zero;* β_1 *= Slope, used to measure the type and magnitude of the impact,* ε_{it} *=Estimation errors or statistical residuals.*

Table 8 reveals the correlation (R) between the independent and dependent variables is 0.442, with an R Square of 0.195. So, the independent variable accounts for 19.5% of the variance in the dependent one. The independent variable's calculated F-value is 16.483, with a significance (Sig) of 0.000 - below the 0.05 acceptable error threshold in social sciences. This supports accepting the research hypothesis.

Table 8. First hypothesis results.

R	R Square	F	Sig	B	Result
0.442	0.195	16.483	0	0.47	Hypothesis Acceptance

The value of β is 0.473, and the positive sign indicates a direct relationship between the variables, with a 47.3% impact.

$$PV_t = B_0 + B_1 AIT_t + B_2 BD + B_3 AIT * BD_{t-1} + \varepsilon_{it} \quad (2)$$

where: BD = Interaction term (Big Data); $AIT * BD$ = Interaction between the independent variable (AI techniques) and the moderating variable (Big Data).

Table 9 shows the correlation (R) between the variables increased to 0.531 after adding the moderator, up from 0.442 without it.

Table 9. Results.

R	R Square	F	Sig	Variable	B	Result
0.531	0.281	33.243	0	*AIT*	0.2	Hypothesis Acceptance
				BD	0.175	
				*AIT * BD*	593	

R Square also rose to 0.281 from 0.195. This means the independent variable (AI techniques) and moderator (big data) now explain 28.1% of the variance in the dependent variable (accounting info's predictive value). The F value with the moderator is 33.243, up from 16.483, with Sig still 0.000 - below the 0.05 social science threshold, validating the statistical model. We also see the Slope (β3) for the interaction term is 0.593, showing the independent variable's impact on the dependent variable increased from 47.3% to 59.3% with the moderator's interaction. The positive coefficient indicates a direct relationship between the variables. So, the sample data provides convincing evidence to support the hypothesis, as the moderating effect was statistically significant.

DISCUSSION

The current study is one of the unique studies that collected the three variables (artificial intelligence techniques, big data, and the predictive ability of accounting information). Nevertheless, AI technologies have proven useful in business and useful in helping investors predict. This is the development of previous research on AI technologies such as (Ahmed et al, 2022) (Ляхович & Вакун, 2023).

The results proved that AI technologies enhance the predictability of financial listings and help investors make more prudent decisions. The results also showed that there is a modified role for big data in that relationship, which is to strengthen AI's perceived impact on predictive capacity.

CONCLUSIONS

The present study concludes the following main conclusions:

1. Techniques of AI help improve the accuracy of predictions and the speed of response to accounting information, assisting in better and more accurate planning of future activities and making better and more accurate decisions.
2. AI techniques save time and effort when analyzing accounting data. In fact, according to the results, it allows accountants to focus their efforts on more challenging and valuable tasks.
3. Techniques of AI have a positive impact on improving the predictive ability of accounting information through their ability to identify patterns and relationships better while avoiding human errors.

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4. Analyzing big data increases the value of AI techniques in improving the predictive ability of accounting information through the volume, speed, and accuracy advantages of big data.

Recommendations

1. The need to update accounting curricula in Iraqi universities to keep abreast of the development of accounting data analysis tools and techniques using artificial intelligence techniques, such as synthetic neural networks and machine learning.
2. The need for financial analysts to utilize big data capabilities and use them in conjunction with artificial intelligence technologies because they are more effective and faster in extracting important patterns and trends from accounting data.
3. Cheque management should improve the accuracy of financial forecasts using AI technologies, helping plan future activities better and more accurately.
4. The need for investors to participate in the stock market with training courses to familiarize themselves with AI techniques, analyze big data and use the skills gained from this when making decisions.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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РОЛЬ ТЕХНОЛОГІЙ ШТУЧНОГО ІНТЕЛЕКТУ В ПІДВИЩЕННІ ПРОГНОЗНОЇ ЗДАТНОСТІ ФІНАНСОВОЇ ЗВІТНОСТІ: ВЕЛИКІ ДАНІ ЯК ІНТЕРАКТИВНА ЗМІННА

Дослідження спрямоване на вивчення та аналіз ролі впровадження технологій штучного інтелекту в підтримці прогнозної здатності фінансової звітності в контексті великих даних. Щоб досягти мети дослідження, автори розробили опитувальник, який включає три осі, пов'язані з досліджуваними змінними. Його поширили в електронному вигляді серед вибірки бухгалтерів, аудиторів та інвесторів на Іракській фондовій біржі. Було зібрано близько 70 відповідей від учасників вибірки, які орієнтувалися виключно на практичний аспект дослідження. Для аналізу результатів використана статистична програма SPSS. Дослідження показало, що технології штучного інтелекту мають статистично значущий ефект у покращенні прогнозної цінності бухгалтерської інформації і цей ефект зростає в контексті застосування великих даних. Серед найважливіших рекомендацій дослідження – необхідність використання фінансовими аналітиками та інвесторами технологій штучного інтелекту, оскільки це сприяє точності та швидкості проведення аналізу й порівнянь, що сприяє підвищенню прогнозної цінності інформації; а також необхідність використання та впровадження аналітики й можливостей великих даних завдяки швидкій і точній обробці інформації, яку вони забезпечують.

Ключові слова: технології штучного інтелекту, штучний інтелект (ШІ), прогностична здатність фінансової звітності, великі дані

JEL Класифікація: G15, M21, M41