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ROLE OF MACHINE LEARNING AND BIG DATA MINING IN FINANCIAL DECISIONS

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Abstract
This research aims to measure the impact of data mining and machine learning technology in analyzing big data on financial decisions and making them in companies. A questionnaire was designed as a data collection tool to achieve this goal. The questionnaire consists of a number (178) of questionnaires distributed to a sample of (accountants, financial analysts, and financial managers) working in private banks listed on the Iraq Stock Exchange. Several (156) valid questionnaire forms were retrieved for analysis and analyzed using the advanced smart-pls statistical program for statistical analysis purposes. The research has reached the most important results: data mining and machine learning technology provide companies with the ability to conduct digital transactions in a transparent, secure, and analyzable manner, which facilitates the preparation and submission of financial reports to decision-makers and reduces the need for traditional analysis. The researcher also recommends that companies realize the importance of big data and invest it effectively, which requires the development of rapid response mechanisms for their customers ' data and efficient processing.

Keywords Mining, Financial Decisions, Technology, financial managers.

INTRODUCTION

Big data mining and machine learning technology seek to transform the vast sea of information into sources of deep analysis and comprehensive understanding through big data that appears amazingly quickly from multiple sources, from social media to sensors and websites. These developments embody enormous challenges and opportunities in modern business, where understanding big data becomes crucial for making strategic decisions with confidence and effectiveness. In the financial context, big data is reflected in its crucial role in enabling sound financial decision-making. Financial decisions are vital to ensure companies' continued growth and

financial success. It includes accurate financial analyses, reliable investment estimates, selection of appropriate financing sources, and setting future financial goals.

Hence, the financial decision-making process requires a comprehensive analysis that includes economic, political, social, and environmental factors to reach solid and sustainable financial strategies in light of a changing and volatile reality. From this point of view, the research was designed into three papers: The first included the research methodology and previous studies, the second dealt with the theoretical side by presenting the literature on research variables, and the third reviewed the

practical side.

The First Topic

Research methodology

1.Research Problem

The accounting field faces many challenges related to big data, which is considered one of the most pressing. These include rapid changes in the financial and economic environment, the phenomenon of financial corruption, the effects of globalization, a lack of knowledge of the latest developments in Information Technology, and other challenges. We must plan quickly to overcome these obstacles and achieve the goals of the accounting profession by empowering accountants and taking advantage of the possibilities of Information Technology. The quality of accounting information is a vital issue today, especially after financial crises that negatively affected users of financial reporting. Information is essential in decision-making, strategic policy development, and company planning. Despite the abundance of data in this era, extensive data analysis is a big challenge for accountants and decision-makers who need help processing and using this data effectively. Therefore, analyzing big data and its role in accounting is an important topic that requires careful discussion and analysis. Moreover, from the problem of research, the following questions arise:

The First question: In the realm of big data, does the use of mining technology have a discernible impact on financial decisions?

The Second question: Does the use of machine learning technology affect financial decisions

2. Research Importance

The importance of the research lies in understanding how the purification of extensive data mining and machine learning can play a crucial role in improving financial decision-making processes through the importance of using big data analytics to examine and analyze financial statements comprehensively and accurately, enabling financial analysts and decision makers to understand trends, patterns,

and factors that affect the financial performance of the company. Moreover, data mining highlights the importance of improving financial decision-making processes, including providing accurate forecasts about future financial performance, identifying potential opportunities and challenges, and improving financial risk management. Data mining technology can enhance the ability of companies to make informed and data-driven financial decisions, contributing to financial success and sustainability in business.

3. Research Aims

This research aims to:

A.Measuring the impact of big data mining technology on financial decisions and making in companies.

B.Measuring the impact of machine learning technology as a data mining and machine learning technology on financial decisions .

4. Research Assumes

A.Data mining technology as a data mining and machine learning technology positively influences financial decisions.

B.Machine learning as a data mining and machine learning technology positively influences financial decisions .

5. Research Variables

A.Independent variables: machine learning and big data mining.

B.Dependent variable: financial decisions.

6. Research Methodology

The research adopted the inductive approach in reviewing and analyzing the literature from multiple sources, including foreign, Arab, and local references. These sources included books, scientific theses, and scientific articles published in scientific journals and reviewing websites available on the International Information Network. Moreover, all these sources have contributed significantly to expanding and strengthening the theoretical side of research.

In the practical aspect, the questionnaire is designed as a data collection tool. The questionnaire consists of a number (178) of questionnaires distributed to a sample of (accountants, financial analysts, chartered accountants, financial managers, and IT experts) working in accounting offices and Iraqi companies listed on the Iraq Stock Exchange. A number of (156) valid questionnaire forms were retrieved for analysis and analyzed using the advanced smart-pls statistical program for statistical analysis purposes.

**7. Search limits** Spatial boundaries: The spatial boundaries are represented in a survey of a sample of (accountants, financial analysts, financial managers, and information technology experts) working in accounting offices and Iraqi companies listed on the Iraq Stock Exchange .

Time limits: A questionnaire was distributed for the period from 16/5/2024 to 20/6/2024

8. The default model of the theoretical research framework

In light of the research hypotheses, objectives, and variables, the default research model can be formulated as follows:

Figure (1) the hypothetical form of research
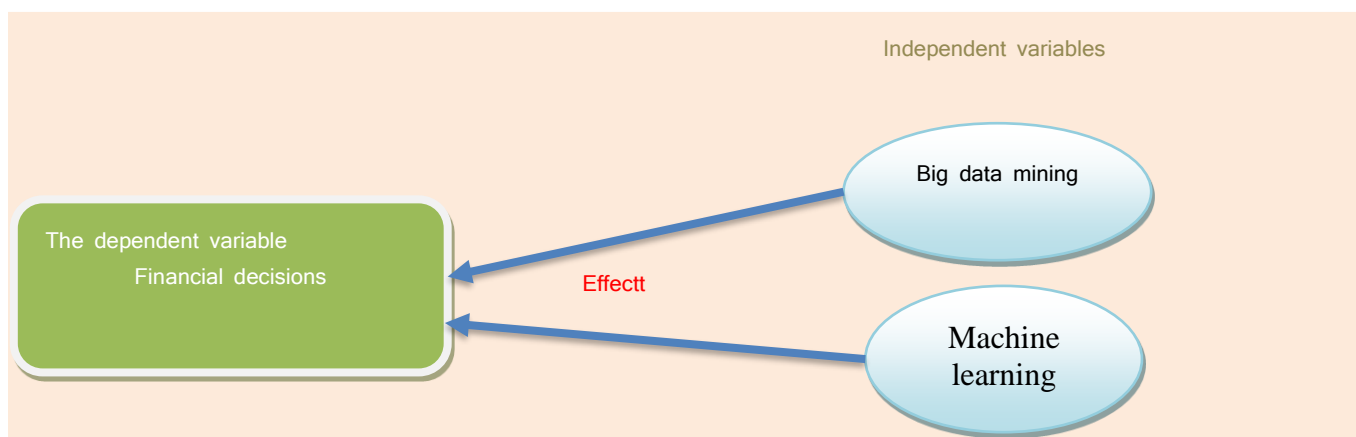
The Second Topic

Theoretical Aspect

First: Big data, data mining and machine learning

1.The concept of big data

The term big data was first proposed by Gartner in 2008, and although it was noticeable at the time, the influence of this term dates back to 2001 when the Meta Group first discussed it. This term expresses a significant increase in the volume of data in terms of the number, speed, and variety of their production. As a result, the search for new solutions to manage this vast volume has become a necessity in the areas of storage and analysis to make the most of this data (quadratic and Dahmon, 2017:25). It can be noted that the topic of big data has received significant attention recently by researchers. There are many definitions provided by researchers for this term, considering (Bahga & Madisetti, 2019, p. 25) that big data is a set of data whose size, speed, or diversity is so enormous that its storage, management, processing, and analysis is a challenge using traditional database methods and data processing tools. (Al-Susi 13:2020) indicates that the data collected from various sources and forms in business environments is characterized by huge quantities, production speed, diversity in forms and sources, and continuous development. (Ghattas, 12:2020) big data is also seen as a complex and extensive set of data collected and stored across multiple

internet platforms and analyzed using various technologies.

2. Classification of big data

The data are divided into three main categories,these classifications are explained below by Arnaud, et al.,2020:4838)).

A-structured or structured data:

Structured data comes in the form of tables or databases, the style of which is controlled in advance by the database schema(Yunus, 13:2020).

B-unstructured or unstructured data:

Unstructured data is electronic data that is difficult to classify easily, forming a significant part of a large data set. This includes content written in social media, videos, photos, blogs and emails. This data created by humans is a rich source of information and its growth is unprecedented (meqnani and shabila, 3:2019).

C-semi-structured or semi-structured data:

Semi-structured data is a combination of the two and refers to data that is close to structured data, but not arranged in tables or databases. These data usually appear as text on web pages or in the minutes of the meeting (Abdullah Al-Hani, 27:2018).

3.Data mining and machine learning technology

The wide spread of Information Technology, the ease of access, and the excellent availability have led to a massive increase in the volume of data available and stored in databases. As the proliferation of big data repositories has become more widespread, many researchers have begun to explore how to make the most of this vast amount of data. They sought to develop techniques, methods, and means of extracting information and knowledge from this big data for problem-solving and decision-making (Abdul Ghaffar, 390:2020), before the advent of Big Data Processing Technologies, companies needed help to collect and store such vast amounts of data. Even with the invention of processing tools, some can only achieve comprehensive results. However, they have

slowly shown excellent performance in multiple areas, such as business model creation and decision-making. Achieving a balance between reducing hardware costs, optimizing processing costs, and achieving added value are the main goals of these technologies (Rawat& Yadav, 2021, p. 3).

A-data mining techniques (Data Mining) :

The method of data mining and knowledge exploration, known as Data Mining, has emerged as a technique aimed at extracting knowledge from huge amounts of data. This technique has the ability to answer a variety of questions, ranging from "what happened?" Right down to "what's going on?""In the present, and even "what could happen in the future?"", Which contributes to the interpretation of events and trends based on historical and current data (Abdul Ghaffar, 391:2020). The technique aims to analyze huge amounts of data to discover previously unknown patterns and relationships, and build models to predict future behavior. This process seeks to transform data from just accumulated information into valuable knowledge that can be exploited to make sustainable decisions. Data mining seems to have found widespread acceptance in large companies, as they realized its value in enhancing competitiveness and improving performance(Asaad & Abdulhakim:2021:18).

He points out (Dahiya et al.,2021: 5) data mining usually refers to the methods necessary to extract implicit and unknown knowledge, as it is a form of discovering the knowledge necessary to solve a variety of problems in a certain scope. Also known as the process of mass analysis of huge amounts of data, this data is carefully examined to discover valuable information that can be used to improve decision-making processes. Thus, data mining is a computer-based information system that examines huge amounts of data to generate information and discover deeper knowledge, enabling the discovery of new connections between the different components of big data. He defined (Ali, 164: 2023) data mining is an advanced tool

for data analysis, it also allows the application of new ideas in the organization of data in a practical way. According to (Papík & Papíková,2022:3), data mining is the exploration of large amounts of data, sorting these data to extract information and identify previously unknown relationships. Models are built to predict behavior, which contributes to obtaining valuable information that enhances and improves the decision-making process.

B-machine learning technology (Machine learning) :

Machine learning is tempting for the business world in this modern era, as its comprehensive advantages and diverse applications to business data offer superior possibilities. Such facilities allow companies to cope competently with dynamic challenges in various industrial sectors. Machine learning has proven its effectiveness in performing complex business tasks with high accuracy, compared to humans, who can need help with large amounts of data and draw accurate conclusions. In addition, integrating multiple processing units contributes to achieving high processing speed and reducing human bias factors (Canhoto & Clear, 2020, p. 184).

The accounting profession has experienced a profound transformation with the widespread adoption of machine learning in various areas, including business risk assessment, transaction analysis, and commercial activities. This technology has piqued the interest of large companies and academics alike. Researchers primarily leverage machine learning to forecast accounting estimates, identify financial errors, predict bankruptcy, and detect fraud. It also fosters the use of inductive reasoning methods in accounting (Atanasovsky et al., 2020:3). One of the key ways machine learning revolutionizes financial accounting is by mitigating common human errors. Many routine data entry practices, billing management, and low-level bookkeeping tasks have been automated with machine learning technologies. This has significantly reduced the risk of accounting information being entered incorrectly and lightened the practical load on accountants.

While some researchers have expressed concerns about the decline in job opportunities in accounting and finance, many feel confident that this shift will free up the time of finance specialists, allowing them to focus on value-added tasks within the company. Machine learning adds tremendous value in the financial sectors, as professionals now have more time to focus on business strategies and improve the efficiency and effectiveness of existing business processes (Elmes et al., 2020:4). Likewise, the established technological basis today offers enormous opportunities, making very large accounting operations easily achievable, since most of the tasks that usually require significant manual labor can be easily and automatically automated, or at least using minimal human effort, through software .Moreover, financial accounting software is currently heavily integrated with artificial intelligence technologies. Any program that does not have machine learning is considered incomplete. Therefore,many accounting tasks such as cost calculations, receivables management, accounts payable processing, tax calculations and risk estimation can be easily automated using machine learning technologies (Fallatah, 2021:2). The demand for accurate financial forecasts and accounting estimates has skyrocketed in recent years. In parallel with this growth, a large number of transactions are regularly conducted in enterprises, machine learning offers the ultimate solution to ensure smooth and accurate information processing.this advanced technological advancement in the field of artificial intelligence has improved conditions in the financial, banking landscape and the field of account analysis. Other key benefits of machine learning include asset valuation and management, forecasting of stock market behavior, calculation of related risks and cost reduction (Aziz & Dowling, 2019:35).

Second: strategic financial decisions

1-The concept of financial decisions

 Financial decisions are one of the most

important decisions that the company relies on in its various activities, as they are aimed at maximizing the market value of the company. These decisions include the financing decision, the investment decision, the dividend decision. A financial decision is a decision that balances obtaining funds and owning assets, as financial decisions are aimed at financing investments with the highest profit and thereby maximizing the market value of the company (Nuri, 11:2019). (Halimi, 39:2020) defines financial decisions as decisions that relate to the financial aspects of the company, such as choosing to reinvest excess liquidity in exchange for profit distribution, choosing between self-financing and external financing. While(Manisha,2020:1) indicates that financial decisions are those decisions that relate to the financial aspects of the company, such as allocating funds, managing the financial affairs of the business, determining the size of investments necessary to achieve its ultimate goals. These decisions also include choosing the type of assets that the company will receive, determining the mode of financing, determining how the company's income will be distributed. (Hammo and Hassan, 144:2021) also show that making financial decisions means choosing the appropriate alternative or the best solution from a set of options available in a specific period of time. This decision is characterized by the fact that it corresponds to the specific problem to be solved, and contributes to the achievement of the goals set by the company or the financial decision-maker.

2-Objectives of financial decisions

The success of financial decisions is one of the main indicators of the company's success, thereby achieving its main goal of maximizing its value, by providing the necessary financial information, forecasting future financial needs, evaluating sources of financing, monitoring funds. Financial decision-making is an essential part of the successful investment of available financial resources (Nouri, 3:2019).It is through making these financial decisions that the financial management department seeks to (Aziz and logani, 9:2014):

Making a profit and maximizing the market value of shares: it is one of the main goals of the owners, and this is related to making the right financial decisions. When a financial manager makes sound decisions, this can lead to an increase in the market value of shares and bring capital gains to the owners. Conversely, if the decisions are incorrect, the value of the shares may decrease, which negatively affects the owners.Wealth maximization: it aims to increase the present value of specific investments or financial actions, not focusing only on making profits themselves. This goal depends on the timing of earnings and also the risk factor. In general, wealth maximization is an ideal strategic goal, focused on achieving the current value of angel investments by approving investment proposals that increase the market value of securities. In addition, owners pay special attention to the regular cash distributions they receive, regardless of their size, because they form an important part of their financial guidance.

3-Types of strategic financial decisions

Modern financial management of strategic financial decisions is divided into three main categories (Reza et al., 242:2017): financing decision, investment decision and dividend decision.

A-The concept of investment decision

Investment decisions are crucial decisions that companies pay great attention to achieving their goals and expanding their business. Among these critical investment decisions are those related to financial investments, through which companies seek to achieve the maximum possible return and increase the value of their share in the market (Abbas and Hadi, 2020,P.3). There is a great diversity of opinions about the concept of investment decisions, and among these opinions are both (Saini and Shahan, 2019, p. 12), who show that the investment decision consists of choosing the investment alternative that is expected to achieve the highest financial return compared to other alternatives, based on a comprehensive analysis of the expected returns and risks associated

with these investments. This decision requires conducting comprehensive feasibility studies of potential alternatives, including financial estimates and various analyses, to assess the feasibility of alternatives to achieve the invested goals. It is then that an informed decision is made that corresponds to the overall strategy and goals of the investor, and the readiness of the chosen variant for implementation is determined by the established methodological framework based on the characteristics of the project and its unique needs. , As he sees (Islamoğlu et al., 2015, p. 531) that investment decisions represent current contributions that are added to the invested capital to own assets that constitute a source of return in the future. (Sharif,95:2022) defines an investment decision as the decision that concerns the decision-makers in using the funds to achieve the maximum possible benefit in exchange for the risks to which they may be exposed. He explains (Bomjan, 2021: 50) that the nature of an investment decision is unique since it is made only once, and its impact extends for a long time, making it an essential part of strategic decisions that affect the company's future course. The investment decision is surrounded by many challenges and problems, such as uncertainty due to currency fluctuations and difficulty quantifying some variables.

B-The concept of financing

The term finance goes beyond the concept of money in general, as it includes the activities carried out by companies and individuals in the economy. No individual, company or even a state can work or continue to live without the necessary funds to cover its activities. Companies in particular are in dire need of financing to meet their financial needs and finance their operations and investments. The financing decision is an important management decision that affects the return and risks to which the company's shareholders are exposed. Therefore, it is essential for companies to plan their financial structure when they need funds to finance their investments and meet their financial needs (al-Mayah, 2019: 21-20). In addition, the financing decision is of great

strategic importance in achieving the well-being of shareholders and ensuring the continuity of the company. This is done by providing the necessary funds to cover various investments and identifying appropriate sources of financing. It is necessary for the management to study and analyze the company's financing needs before making any decisions related to financing. It must be determined whether the financing needs can be met through the company's own capital or through borrowing from external sources (Thalib et al.,2019: 87), corporate finance processes play a prominent role in corporate management and financial decision-making, as they are considered one of the main factors influencing financial and managerial decisions (Sharbati et al.,2014:24), according to (Zutter &Gitman, 2012: 4) finance is defined as the "science and art of money management", as finance is defined as the study of how individuals, institutions, governments and companies obtain funds and other financial assets, as well as how they are spent and managed (Melicher & Norton, 2013:4), and according to (Friday, 2016: 24) finance is one of the areas of knowledge that includes a set of facts, scientific foundations and theories that deal with how money is obtained from its various sources and used effectively by individuals, entrepreneurs, companies and governments. As defined by both (Al-Salami and Al-Sharifi, 2022: 159) defines finance as the set of decisions related to how to obtain the necessary funds to finance the company's investments and determine the optimal financing mix from borrowed sources of financing and funds owned in the company. To cover the company's investments. He also referred (Galane, 2019: 17) to financing as the process of raising the necessary capital for the company in order to finance operational or investment costs".

C-The concept of profit distribution decision

Dividend distribution decisions are one of the most prominent strategic financial decisions taken by financial managers in companies, as they receive special attention due to their importance in balancing the interests of

shareholders and ensuring the sustainability of the company's growth (Walid and Shaaban, 59:2023). the dividend distribution policy is based on making a decision comparing two main options: either distributing profits to shareholders or retaining them for reinvestment within the company. There are several definitions of the decision to distribute dividends, where profit in this context is considered to be the return achieved by the company during a specific period of time (buhafs, 58:2021), and both (Dabbash and Mahmoud, 71:2015) believe that the decision to distribute dividends is the decision to divide the profits between distributing them to shareholders and reinvesting part of them in the company. This decision is influenced by previous investment and financing decisions. The more effective these decisions are, the greater the company's chances of making continuous profits. He defined (Vodwal & Negi, 2023:9) dividend distribution decisions as the steps taken by the company to dispose of the profits achieved, whether by retaining and reinvesting them or by distributing them to shareholders through various forms of distribution such as cash distribution or offering new shares, among others. This decision provides for the payment of additional financial amounts and their transfer from the company's activities to shareholders, with the need to provide the necessary liquidity to fulfill its financial obligations.

Dividend decisions also refer to the policy established by the company, which corresponds to its current nature and decisions, regarding the distribution of dividends to shareholders in the form of cash or shares, or withholding part of the profits to be used in its future decisions related to expansion, growth and investment. The decision to distribute dividends is the prerogative of the company's Board of directors (hafsi, 2016, 40). And from the point of view of (Haj, 36:2023), the distribution decision is the decision made by the company as to whether the profits should be distributed to shareholders or kept for reinvestment. Such decisions usually indicate a specific percentage of the realized profit that should be distributed, based on which the percentage that should be reserved for future investment is determined.

The Third Topic

The Practical Side

In the practical aspect of research, a survey form is designed to test research hypotheses. This form consists of three main axes:

The first axis includes six questions to measure data mining technology.

The second axis includes six questions to measure machine learning technology

The third axis includes three dimensions, and aims to evaluate strategic financial decisions collectively, as each of them contains six questions.

A seven-degree scale was used to express the sentences of the mentioned axes and dimensions. The measurements ranged from one point indicating "notcompletely agree", to seven points indicating "completely agree", as shown in the following table:

Table (1) the grades used in the heptagonal scale and their default mean

I don't quite agree	I don't agree	I don't agree to some extent ١	neutral	Agree to a somewhat	agree	I totally agreeا	Response
1	2	3	4	5	6	7	الدرجة
Default scale mean = (sum of values for all responses) / (number of scale categories)							

As for the heptatonic Likert scale, it consists of seven categories (from 1 to 7).

The default mean of the scale is calculated as follows:$(7 + 6 + 5 + 4 + 3 + 2 + 1) / 7 = 4$ degrees

Source. By researcher

178 questionnaire forms were distributed and 156 of them were collected from the respondents. The description of the individuals surveyed follows.

The following are the results of the descriptive statistics (of the responses obtained):

	A6	A5	A4	A3	A2	A1	Sequencing	
	34	37	26	32	30	37	Repeat	**Totally agree**
	22%	24%	17%	21%	19%	24%	Ratio %	
	63	47	68	60	57	62	Repeat	**agree**
	40%	30%	44%	38%	37%	40%	Ratio %	
	24	37	20	31	29	23	Repeat	**Agree to some extent**
	15%	24%	13%	20%	19%	15%	Ratio %	
Arithmetic mean, standard deviation and coefficient of variation for data mining dimension	16	13	20	7	19	10	Repeat	**Neutral**
	10%	8%	13%	4%	12%	6%	Ratio %	
	8	14	10	13	6	14	Repeat	**Agree to some extent**
	5%	9%	6%	8%	4%	9%	Ratio %	
	8	1	6	7	10	4	Repeat	**disagree**
	5%	1%	4%	4%	6%	3%	Ratio %	
	3	7	6	6	5	6	Repeat	**I don't quite agree**
	2%	4%	4%	4%	3%	4%	Ratio %	
5.382	5.382	5.316	5.230	5.451	5.412	5.503	Middle of my account	
1.262	1.480	1.539	1.546	1.586	1.564	1.568	Standard deviation	
0.275	0.275	0.290	0.296	0.291	0.289	0.285	Coefficient of variation	
	1	4	6	5	3	2	Order of paragraphs	

Source: from researcher based on the Excel program

* The data of Table (2) show that the weighted arithmetic mean of this axis is 5.382, which is higher than the assumed average of the 4-degree scale. The standard deviation also amounted to 1.262, and the coefficient of difference was 0.275, which indicates a significant convergence of the opinions of the questionnaire sample on the paragraphs of this dimension.

In general, it can be said that respondents believe that data mining technology contributes significantly to improving the accuracy of financial forecasts, risk assessment and making strategic financial decisions, with a difference in the extent of agreement on some items.

The standard deviation is the highest value used among dispersion measures to measure the extent of statistical variation. The standard deviation reflects how widespread the values are within the data set, since the dispersion decreases the smaller the standard deviation from the arithmetic mean. This is usually understood as a consensus of views among the respondents in the questionnaire.

	B6	B5	B4	B3	B2	B1	Sequencing	
	27	33	42	30	33	34	Repeat	Totally agree
	17%	21%	27%	19%	21%	22%	Ratio %	
	62	47	49	58	54	52	Repeat	agree
	40%	30%	31%	37%	35%	33%	Ratio %	
	23	33	28	25	31	25	Repeat	Agree to some extent
	15%	21%	18%	16%	20%	16%	Ratio %	
Arithmetic mean, standard deviation and coefficient of variation of the investment dimension	23	24	16	20	19	13	Repeat	Neutral
	15%	15%	10%	13%	12%	8%	Ratio %	
	8	8	9	9	6	19	Repeat	Agree to some extent
	5%	5%	6%	6%	4%	12%	Ratio %	
	8	2	7	8	5	4	Repeat	disagree
	5%	1%	4%	5%	3%	3%	Ratio %	
	5	9	5	6	8	9	Repeat	I don't quite agree
	3%	6%	3%	4%	5%	6%	Ratio %	
5.232	5.212	5.199	5.372	5.205	5.269	5.135	Middle of my account	
1.273	1.540	1.583	1.582	1.592	1.583	1.706	Standard deviation	
0.243	0.296	0.304	0.295	0.306	0.300	0.332	Coefficient of variation	
	2	4	1	5	3	6	Order of paragraphs	

Table (4) respondents ' response to the investment dimension

The coefficient of variation is the ratio of the standard deviation to the mean. The level of dispersion around the mean decreases as the coefficient of variation decreases. This reflects the degree of variation in individual answers relative to the average responses of the respondents.

The coefficient of difference in the order of paragraphs was used because it reflects the importance of each paragraph. The lower the

coefficient of difference, the more it indicates the convergence of the opinions of the respondents in the questionnaire, and therefore the paragraph is assumed to be of greater importance.

* It is clear from the data in Table (9) that this

dimension has an arithmetic mean of 5.229, which is higher than the default average of 4 degrees. The standard deviation was 1.304, and the coefficient of difference was 0.249, which indicates a significant convergence of the opinions of the questionnaire sample about this dimension.

* The third axis - the second dimension: - financing

	E6	E5	E4	E3	E2		Sequencing	
	35	25	37	34	27	46	Repeat	Totally agree
	22%	16%	24%	22%	17%	29%	Ratio %	
	38	52	42	46	51	53	Repeat	agree
	24%	33%	27%	29%	33%	34%	Ratio %	
	41	27	32	46	36	29	Repeat	Agree to some extent
	26%	17%	21%	29%	23%	19%	Ratio %	
Arithmetic mean, standard deviation and coefficient of variation of the investment dimension	13	25	24	12	22	12	Repeat	Neutral
	8%	16%	15%	8%	14%	8%	Ratio %	
	10	16	7	12	8	7	Repeat	Agree to some extent
	6%	10%	4%	8%	5%	4%	Ratio %	
	11	5	6	3	7	4	Repeat	disagree
	7%	3%	4%	2%	4%	3%	Ratio %	
	8	6	8	3	5	5	Repeat	I don't quite agree
	5%	4%	5%	2%	3%	3%	Ratio %	
5.229	5.064	5.038	5.179	5.365	5.167		Middle of my account	
1.304	1.712	1.564	1.639	1.378	1.501		Standard deviation	
0.249	0.338	0.310	0.316	0.257	0.291		Coefficient of variation	
	6	4	5	1	3		Order of paragraphs	

	F6	F5	F4	F3	F2	F1	Sequencing	
	21	24	18	24	29	37	Ratio %	Totally agree
	13%	15%	12%	15%	19%	24%	Repeat	
	59	47	72	61	50	36	Ratio %	agree
	38%	30%	46%	39%	32%	23%	Ratio %	
	28	34	33	26	36	37	Repeat	Agree to some extent
Arithmetic mean, standard deviation and coefficient of variation of the investment dimension	18%	22%	21%	17%	23%	24%	Ratio %	
	13	30	19	22	15	23	Ratio %	Neutral
	8%	19%	12%	14%	10%	15%	Ratio %	
	22	5	8	15	11	11	Repeat	Agree to some extent
	14%	3%	5%	10%	7%	7%	Ratio %	
	10	5	6	3	10	4	Ratio %	disagree
	6%	3%	4%	2%	6%	3%	Repeat	
	3	11	0	5	5	8	Ratio %	I don't quite agree
	2%	7%	0%	3%	3%	5%	Ratio %	
5.131	5.013	4.974	5.353	5.179	5.135	5.135	Middle of my account	
1.124	1.565	1.629	1.213	1.478	1.586	1.625	Standard deviation	
0.219	0.312	0.327	0.227	0.285	0.309	0.317	Coefficient of variation	
	4	6	1	2	3	5	Order of paragraphs	

	G6	G5	G4	G3	G2	G1	Sequencing	
Arithmetic mean, standard deviation, coefficient of variation of the dividend dimension	24	32	44	28	18	25	Repeat	**Totally agree**
	15%	21%	28%	18%	12%	16%	Ratio %	
	54	58	42	60	58	69	Repeat	**agree**
	35%	37%	27%	38%	37%	44%	Ratio %	
	28	24	28	20	41	30	Repeat	**Agree to some extent**
	18%	15%	18%	13%	26%	19%	Ratio %	
	29	12	19	19	14	9	Repeat	**Neutral**
	19%	8%	12%	12%	9%	6%	Ratio %	
	10	11	13	15	6	7	Repeat	**Agree to some extent**
	6%	7%	8%	10%	4%	4%	Ratio %	
	8	14	5	3	13	6	Repeat	**disagree**
	5%	9%	3%	2%	8%	4%	Ratio %	
	3	5	5	11	6	10	Repeat	**I don't quite agree**
	2%	3%	3%	7%	4%	6%	Ratio %	
5.160	5.109	5.167	5.321	5.090	5.032	5.244	Middle of my account	
1.292	1.470	1.686	1.597	1.704	1.562	1.623	Standard deviation	
0.250	0.288	0.326	0.300	0.335	0.311	0.309	Coefficient of variation	
	1	5	2	6	4	3	Order of paragraphs	

Table (6) respondents ' response to the distribution of profits

Source: from the researcher based on the Excel program

Table (6) shows that this dimension has a weighted arithmetic mean of 5.160, which is higher than the default mean of 4 degrees, with a standard deviation of 1.292 and a coefficient of variation of 0.250, which indicates a significant convergence of the opinions of the respondents.

Testing research hypotheses and interpreting results

Encoding of variable paragraphs

To facilitate the statistical analysis of the data, the variable paragraphs and their dimensions were simplified by symbols , which are as follows in the table below

code						dimensioning	Variable name
A1	**A2**	**A3**	**A4**	**A5**	**A6**		Data mining
B1	**B2**	**B3**	**B4**	**B5**	**B6**		Machine learning
E1	E2	E3	E4	E5	E6	Investment	Strategic financial decisions
F1	F2	F3	F4	F5	F6	Funding	
G1	G2	G3	G4	G5	G6	Distribution of profits	

Results of the research hypothesis test

In this part, the researcher will analyze the research hypotheses that address:

The first hypothesis: data mining technology as one of the big data analysis techniques positively affects financial decisions.

The second hypothesis : machine learning technology as one of the big data analysis technologies positively affects financial decisions .The first hypothesis " data mining technology as one of the data mining and machine learning technologies positively affects strategic financial decisions "

The path shown in the figure below is illustrated for the purpose of hypothesis testing:

Figure (2) the course and results of the first hypothesis test
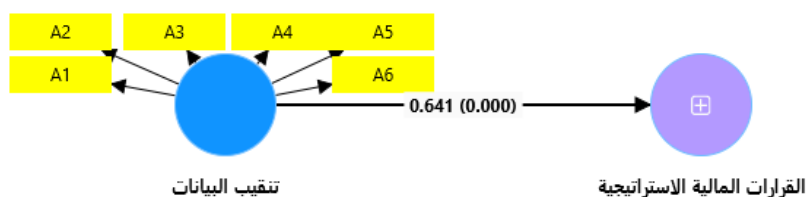
Route	Original sample (Bata)	Standard deviation (STDEV)	T statistics	P values
Data mining - > strategic financial decisions	0.641	0.068	9.449	0.000

Source: from the researcher's preparation based on the Smart-Pls program

The above table shows the following:

- In the Social Sciences, the lowest acceptable error rate is 0.05, and it can be seen from table (3-21) above that the p-Value was 0.000, which is much less than the accepted error value

- The track coefficient of 0.641 indicates that there is a strong positive relationship between data mining technology and strategic financial decisions.

- The value of T 9.449 indicates that the path coefficient differs from zero significantly.

- Accordingly, the first sub-hypothesis of the research is accepted.

The table below shows the values of both R-square and F-square:- R-square: shows the amount of interpretation of the model. And F-square: shows the extent of the effect for the independent variable.

Table (9) the coefficients of interpretation and influence of the first sub-hypothesis

Route	R-square	F-square
Data mining - > strategic financial decisions	0.411	0.698

Source: prepared by the researcher based on the Smart-Pls program

From the intersection of the R-square value and the F-square value in the previous table (18), with the explanations associated with these values, the following is noted:

- It shows that the data mining technique explains 41.1% of the variation in strategic financial decisions, and this explanation is considered average, since the coefficient of interpretation R-square ranges between 0.19 and 0.67.

- It also shows that data mining technology affects 69.8% of strategic financial decisions,and this impact is considered significant, as the value of F-square exceeded the barrier of 0.35.

This finding is consistent with the findings of Changpetch& Reid,2021, that data mining contributes significantly to supporting the decision-making process and promotes the activation of connectivity between different departments in the company, as well as allows them to optimize the use of data resources. In addition, data mining promotes effective planning through the improvement and development of established accounting information systems. It also contributes to understanding the company's ability to grow and follow developments in the market.

The second hypothesis " machine learning technology as a data mining and machine learning technology positively influences strategic financial decisions ."

The path shown in the figure below is designed to test the hypothesis:

Route	Original sample (Bata)	Standard deviation (STDEV)	T statistics	P values
Machine learning - > strategic financial decisions	0.529	0.080	6.589	0.000

Source: from the numbers of the researcher based on the Smart-Pls program

The above Table shows the following in the Social Sciences: the minimum acceptable error ratio is 0.05,. It is shown from Table (19) above that the p - Value was 0.000, which is much lower than the acceptable error value path coefficient of 0.529, indicates a positive, moderate to strong relationship between machine learning technology and strategic financial decisions.- A standard deviation of 0.080 indicates that the estimate is relatively accurate.- The value of T 6.589 indicates that the path coefficient differs from zero significantly. Thus, the second sub-research hypothesis is accepted.The table below shows the R-square and F-square values: the R-square value shows the amount of interpretation of the model. And the F-square value shows the amount of influence of the independent variable.

Table(11) coefficients of interpretation and effect of the second hypothesis

Route	R-square	F-square
Machine learning - > strategic financial decisions	0.28	0.389

Source: from the numbers of the researcher based on the Smart-Pls program

Our research findings, as evidenced by the significant values of R-square and F-square in the table above (20), underscore the profound impact of machine learning. We discovered that machine learning accounts for 28% of the variation in strategic financial decisions, a substantial influence given the R-square interpretation coefficient's range of 0.19-0.67. Furthermore, machine learning's effect on audit quality is a staggering 38.1%, a finding of utmost importance as the F-square value exceeded 0.35.

This result is consistent with the findings of Aziz & Dowling, 2019 that machine learning technology machine learning provides the ultimate solution to ensure smooth and accurate information processing. This advanced technological advancement in artificial intelligence has improved financial, banking, and account analysis conditions. Other key benefits of machine learning include asset valuation and management, predicting stock market behavior, calculating related risks, and reducing costs, which lead to strategic financial decisions.

CONCLUSIONS

1-The use of data mining and machine learning technology in accounting is a new stage that enhances the development of this field, as it contributes to reducing the effort expended and errors in financial reporting.

2-The advantages of data mining and machine learning technology, such as efficiency, accuracy, and speed, enhance accountants' capabilities and develop their skills, improving their professional performance.

3-There is no need to worry about the replacement of accountants with data mining and machine learning technology. Companies will still rely on accountants who are proficient in data analysis and interpretation, and can provide valuable consulting. This emphasizes the security of their job roles and the importance of staying updated with technological advancements.

4-Data mining and machine learning technology allow companies to conduct transparent, secure, and analyzable digital transactions. This facilitates the preparation and submission of financial reports to decision makers and reduces the need for traditional analysis.

5-The use of data mining and machine learning technology in accounting in Iraq faces many challenges, including accountants' lack of experience and adequate training to use these technologies effectively.

6-Data mining technology positively influences strategic financial decisions by carefully examining operations, improving efficiency, and understanding the various dimensions of operations, which contributes to improving the company's overall performance.

7-Machine learning technology, with its ability to analyze data quickly and accurately, significantly impacts strategic financial decisions. This not only helps to detect problems, save time, and reduce costs but also enables the prediction of risks and optimization of the planning and decision-making process. This optimistic view of the future of accounting can inspire the audience to embrace technology.

RECOMMENDATIONS

1-Companies should adopt the concept of big data and integrate it into their philosophy and strategy in the short and long term, as these data contribute to achieving integration between them and the Accounting Information System and are considered a successful alternative in light of continuous technological development.

2-Banks, in particular, stand to gain significant value from big data. They can increase its value

by effectively processing and generating information from it. This necessitates the development of efficient mechanisms to process the data, ensuring that the benefits far outweigh the costs of collection and analysis.

3-Work should be done to integrate various data sources into the accounting information system so that text, voice, and image data are gradually linked with traditional data. This will allow the system to deal with large amounts of data and control them effectively.

4-It is imperative for companies to invest serious efforts in understanding the nature and characteristics of big data. By mastering the techniques of collecting and analyzing big data, they can obtain accurate, fast, relevant, efficient, effective, flexible and reliable information, enhancing their capabilities for making strategic financial decisions.

5-Seminars and workshops should be organized in universities and specialized centers to discuss the topic of big data and how to benefit from it in the development of the Accounting Information System, which reflects positively on the performance of companies in general and provides new insights for analysis and analysis—processing big data in various sectors and linking it to other variables such as electronic disclosure or cloud accounting. Or artificial intelligence.

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