



Artificial Intelligence Applications in Finance: A bibliometric Analysis

Mourad MERMI^{1*}, Djamel Eddine KHACEF²

¹ Setif 1 University Ferhat Abbas (Algeria), mourad.mermi@univ-setif.dz.

Laboratory of 'Partnership and Investment in SMEs in the Euro-Maghreb Space (LPIEEM)

² Setif 1 University Ferhat Abbas (Algeria), djkhacef@univ-setif.dz.

Laboratory of Evaluation of Algerian Capital Markets (LEMAC)

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Abstract:

This study aims to review and analyze the existing literature on the topic of artificial intelligence (AI) applications in finance. In doing so, we conducted a bibliometric analysis of 193 relevant articles indexed in the SCOPUS database between 2005 and 2024. The findings reveal that the number of publications on AI applications in finance has increased gradually starting from 2017 to present. The study also presented the lists of most productive authors and the most relevant journals that published more numbers of articles on this topic. The findings from this research also showed that "machine learning "(ML) has emerged as the most frequently term used in the reviewed literature. Notably, the combination of ML and risk management has been identified as the most frequently discussed topic. In addition, the study also illustrated that the most important countries that examined this topic are the US, UK, and China.

Keywords: Artificial Intelligent (AI); Machine Learning; Finance; Bibliometric Analysis; SCOPUS.

JEL Classification Codes: O33, B41, G2, G3.

*Corresponding author.

1-Introduction:

Artificial Intelligence (AI) has seen rapid advancements in recent years. It is now applied in many economic sectors, including the financial one. AI applications in finance industry have brought about substantial improvements in both efficiency and reliability, leading to a positive overall impact (Ghassani, Sari, & Marselian, 2024). The implementation of various AI technologies, such as Machine Learning (ML) algorithms and intelligent agents, has notably reduced errors and streamlined processes that were once prone to human error and inefficiencies. ML algorithms analyze vast amounts of data, identify patterns, and make predictions, enhancing the accuracy and speed of financial analyses. Intelligent agents can perform tasks autonomously, help in managing routine operations, thereby freeing up human resources for more strategic roles (Berdiyeva et al., 2021; Rahim & Chishti, 2024). AI has also revolutionized the finance industry by transforming how data is processed and how decisions are made (Cao et al., 2024). AI has been implemented across various areas within the financial sector, such as risk management, credit valuation, fraud detection, and customer service, where AI systems can process information much faster and more accurately than humans.

The implementation of AI technologies across diverse financial areas has attracted growing interest among researchers and scholars, leading to a notable expansion in research on this topic in recent years. However, comprehending the scope, emerging trends, and the main findings of this research remains difficult, owing to the interdisciplinary nature of the domain and the rapid evolution of related technologies. Therefore, we conduct a bibliometric analysis on AI applications in finance to prior studies indexed in SCOPUS database during the period (2005-2024), thorough which we aim to offer a comprehensive overview of the existing literature on this subject and to address the following questions: (1) What is the number of papers that explored the topic of AI applications in finance during the period of study? (2) What are the countries that are considered as leaders in this topic? (3) What are the most relevant journals that publish works in the topic? (4) Who are the most productive authors in this subject? (5) What are the most frequently keywords used?

After answering these questions and formulating conclusions, this study may offer a valuable guide for researchers who are new and unfamiliar to this topic and it may also provide a solid foundation for future empirical investigations. Additionally, the present research complements and supports some other previous studies that used bibliometric analysis approach or systematic reviews on the same topic, such as the ones conducted by (Shamima et al., 2022), (Bahoo et al., 2024) (Černevičienė & Kabašinskas, 2024), (Rustandi & Arifin, 2024), and (Rodríguez et al., 2025). These studies are close similar to our work, however, they differ in some aspects, like the period of time selected, and not all studies used SCOPUS database as the main source to conduct the bibliometric analysis like we do in this study, as the study of Bahoo et al. used Web of Science database, while the study of Černevičienė & Kabašinskas relied on both Web of Science and SCOPUS databases. Additionally, each study used a different set of keywords in searching for the sample of reviewed literature.

The structure of this paper is as follows: this Section 1 represents the introduction of the study. Section 2 includes literature review. Section 3 presents the research methodology. Section 4 includes results and discussion. Finally, Section 5 represents the conclusion of the study.

2. Theoretical Background:

2.1 Artificial Intelligence and its Applications in Economy:

AI is defined as the capacity of computers or other machines to exhibit or simulate intelligent behavior and can be used to perform tasks or produce output previously thought to require human intelligence (Oxford English Dictionary, 2023). It is a broad field, of which Machine Learning (ML) is a sub-category, which is a method of designing sequences of algorithmic steps to solve a particular problem. Deep Learning (DL) is a form of ML that utilizes algorithms organized in ‘layers’ inspired by the function and structure of human brain. These techniques can be used to find patterns in large amounts of data (big data analytics) from increasingly diverse and innovative sources (Financial Stability Board, 2017).

The term “Artificial intelligence” was first introduced by John McCarthy in 1956 at Dartmouth College conference to describe “thinking machines”. Progress in AI research remained limited until 2000, primarily due to insufficient computing power and storage capability. In this period, AI endured two major funding shortages, in 1974–1980, and again in 1987–1993, which are known as “AI winters” (Bahoo et al., 2024). However, the most remarkable expansion of AI-related technologies has occurred in recent years, driven by the explosion of computing power, the availability of large-scale unstructured datasets, and increased venture capital invested in innovative technological projects (Ernst et al., 2018).

Even though AI dates back to the 1950s, its capabilities have increased significantly in recent years. This is prompting the development of numerous practical applications in many different fields and domains of life. It is rapidly becoming a tool that empowers and reshapes our lives. AI tools can offer major benefits, allowing many tasks to be automated and boosting analytical capacity compared with traditional techniques (Fernández, 2019). We can see now that AI is applied in many fields, including economy. The application of AI spans a wide range of economic sub-fields, such as marketing, manufacturing, customer service, human resources, finance, and so on. Within each sub-field, AI can facilitate more data-driven and informed decision-making, boost operational efficiency, optimize workflows, and elevate the customer experience. However, AI also presents a series of limitations that can make them unsuitable for certain activities, along with a set of risks that must be managed appropriately.

2.2 Artificial Intelligence in Finance:

The term “finance” describes the management of money in all its manifestations, including cash, accounts receivable, marketable securities, and inventory. It pertains to transactions and money management and examines the processes by which capital is obtained for investment in productive assets, as well as the decision-making involved in investment and allocating scarce resources over time (Rodríguez et al., 2025).

AI is playing an important role in finance, providing various benefits and opportunities. AI technologies in the financial industry have rapidly developed, from automation in transactions to the use of ML and DL for predictive analysis and risk management (Rustandi & Arifin, 2024). For example, in the banking sector, many studies emphasized this role, including in optimizing operations, enhancing customer service, improving operational efficiency, enabling more accurate risk assessment, and fraud detection (Khuan et al., 2024). In general, AI is applied across numerous financial domains, including credit scoring, risk management, fraud detection, robo-advisory, algorithmic trading asset, and wealth management (Hentzen et al., 2022).

Given that the financial sector is characterized by its vast and complex data, it stands to

benefit greatly from the advancements in AI technologies, which provide a promising solution by not only managing large datasets effectively, but also generating synthetic data close to real-world financial data. This capability is particularly important for applications such as risk management, fraud detection, algorithmic trading, and financial forecasting (Lee et al., 2024).

While AI has the potential to transform the financial sector, its full deployment is still evolving, offering opportunities for cost reduction, enhanced customer experience, and financial inclusion (Kumar et al., 2023). Therefore, the financial industry is gradually recognizing the benefits of AI and is expected to continue its adoption and integration to improve various aspects of its operations.

3. Research Methodology:

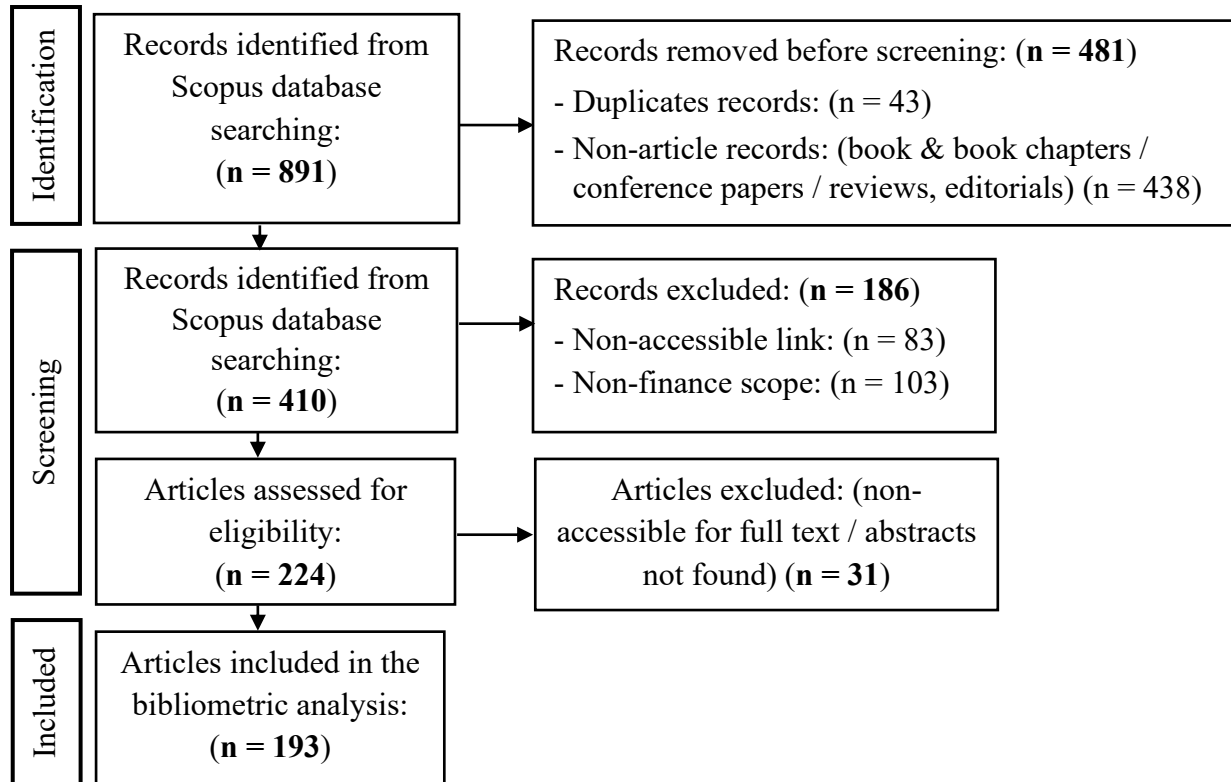
This study uses bibliometric analysis method to address the research questions. This method emphasizes the significance of well-structured and reliable datasets, as well as strategic visualization techniques to gain meaningful insights from complex information networks (N.Dao et al., 2024). It also offers numerous benefits, such as revealing patterns, trends, and interrelationships in the production and usage of scholarly literature, enhancing understanding of knowledge evolution, and contributing to the evaluation of scientific literature (Ghassani, Sari, & Marselian, 2024). We used SCOPUS database as a main source to retrieve published literature on the topic studied. SCOPUS was chosen to ensure articles from reputable journals.

In formulating the search string for this study, a set of keywords was entered focusing on two interdisciplinary elements: “artificial intelligence” and “finance” and using Boolean operators “AND” and “OR”. (i.e. “artificial intelligence” OR “AI” OR “machine learning” OR “deep Learning” OR “artificial neural networks” OR “natural language processing” OR “internet of thing”) AND (“finance” OR “financial services” OR “fintech” OR “banking” OR “financial data management”). It was necessary to include all these main keywords to cover the broad spectrum of concepts in the topic of AI in finance. This method of formulating queries aligns with best practices in bibliometric analysis, ensuring a comprehensive and inclusive search process (Afjal, 2023).

The initial search yielded a total of 891 publications. Then, these publications were screened by using PRISMA protocol (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) in accordance with filters and a series of inclusion and exclusion criteria in order to condense the search results to a more manageable collection of articles suitable for review and analysis. The reason behind employing this protocol is its ability to improve dependability across different reviews, its recognition for exhaustiveness, and the recent widespread use in numerous bibliometric studies (Afjal, 2023).

We applied several filters to refine the search results. The first filter set a temporal range constraint, including documents published between 2005 and 2024. The second filter addressed subject areas, encompassing Computer Science; Business, Management, and Accounting; Economics, Econometrics, and Finance; and Social Sciences. The third filter pertained to document type, considering only journal articles. The last filter limited the results to English-language papers. Figure 1 shows the PRISMA flow diagram, outlining the processes of the identification and screening of the literature related to the topic of AI applications in finance.

Figure 1. PRISMA Flow Diagram



Source: Authors' own work using PRISMA template retrieved from the Website:

<https://www.eshackathon.org/software/PRISMA2020.htm>.

Ultimately, a total of 193 articles met the inclusion criteria and were included into the bibliometric analysis. In this research, we used VOSviewer software, which is freely available for researchers and is commonly used for bibliometric analysis to present the structure of knowledge and dynamics of research (Janková, 2021). This software is employed for network visualization, allowing for the identification of keyword co-occurrences, citations patterns, thematic relationships, and authorship trends.

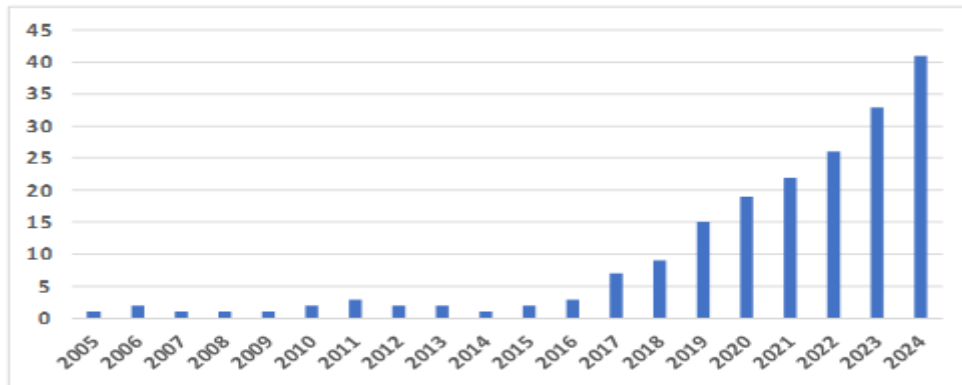
4. Results and discussion:

This section discusses the outcomes of bibliometric analysis conducted. It is divided into five sub- sections according to the number of research questions.

4.1. Annual Scientific Production:

Figure 1 plots the annual absolute number of publications related to the topic “AI Applications in Finance” for the sampled documents during the period (2005-2024).

Figure 2. Evolution of Scientific Production on “AI Applications in Finance” (2005-2024)



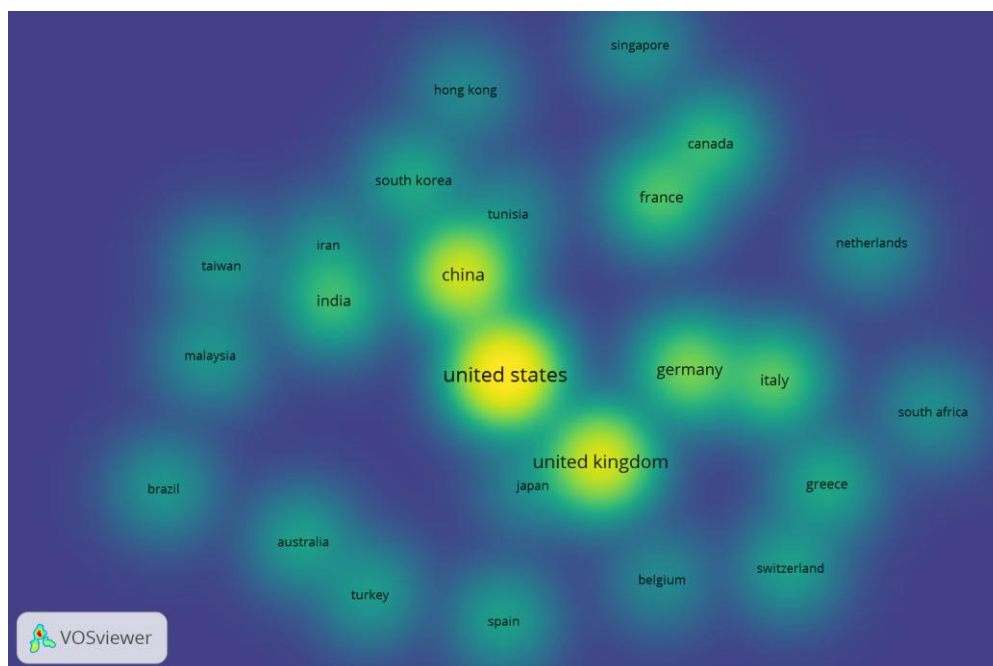
Source: Prepared by the authors using data collected from SCOPUS database.

The figure above shows that there is a considerable lack of research on the topic related to “AI applications in finance” until 2017. This may be due to the limited amount of data that was then available. But starting from that year, the number of publications began to rise. This topic has become increasingly significant in recent years. Since 2019, the rapid expansion and the degree of AI application in finance have strengthened significantly, leading to big in related research publications (Rodríguez et al., 2025; Bahoo et al., 2024). The availability of massive data, improvements in processing power, and the development of complex algorithms are most likely contributing factors (Zakaria et al., 2023).

4.2. The Most Relevant Countries

The figure below shows the number of published papers from different countries during the period studied, which is presented as a spectral map of these countries.

Figure 3: Spectral Map of the Most Relevant Countries



Source: Authors’ own using VOSviewer software.

We can see that our sample covers many countries across the world; however, the United States, United Kingdom, and China are the foremost producers of scientific output. India, Canada, and some other European countries such as Germany, Italy, and France come in the next position. These results confirm that these countries are the leaders of the AI-driven financial industry, as suggested by many studies and reports. Note that as the United States and China compete to lead the world in the field of AI, their visions have increasingly begun to collide. This is often framed as a fundamental clash of civilizations, with evidence largely grounded in each country's current political system and ongoing geopolitical tensions (Hine & Floridi, 2022).

4.3. Top Ten Relevant Journals

The sample of articles analyzed in this study were published across many journals indexed in SCOPUS database. Table 1 presents the top-ten list of journals that publish works in the topic, which ranked on the basis of the number of articles published in each journal.

Table 1. The Top Ten Relevant Journals

Rank	Journal's Name	No of Articles	Publisher
1	Quantitative Finance	17	Taylor & Francis Ltd.
2	Intelligent Systems in Accounting, Finance and Management	15	John Wiley & Sons Ltd.
3	Journal of Banking and Finance	14	Elsevier
4	International Journal of Forecasting	13	Elsevier
5	International Journal of Finance and Economics	11	John Wiley & Sons Ltd.
6	The Journal of Finance and Data Science	9	KeAi Publishing
7	Computational Economics	8	Springer
8	European Journal of Finance	7	Taylor & Francis Ltd.
9	Technological Forecasting and Social Change	7	Elsevier
10	Computational Intelligence and Neuroscience	6	Hindawi Publishing

Source: Authors' own creation based on the research data.

The top ten journals include between 6 to 17 articles, which are mostly published by Elsevier, John Taylor & Francis Ltd., and John Wiley & Sons Ltd. Three of these top ten journals are owned by Elsevier, two by John Taylor & Francis and Taylor & Francis for each one. The other three journals are published by KeAi Publishing, Springer, and Hindawi Publishing Corporation. This reflects the important place of these journals and publishers in the academic research area at the international level, and the extent to which they are interested in publishing research on various important contemporary topics.

In addition, this list of top journals can be used as a guide for novice researchers in the area, and can also help them find an outlet for their articles in a similar area (Zakaria et al., 2023). Therefore, this study can be used as a future reference for other researchers, as it provides a valuable analysis of the applications of AI in finance industry.

4.4. The Most Productive Authors

The most productive authors who have published on AI applications in finance are shown in the following Table.

The findings displayed in Figure above indicate that the most significant keywords in the research topic were as follows: “machine learning”, “artificial intelligence”, “deep learning”, “AI”, “artificial neural network”, “finance”, “risk management”, “forecasting”, “decision making”, “fintech”, “neural language processing”, and “banking”.

The term "machine learning" emerged as the most frequently used keyword in the reviewed literature related to the topic studied, followed by "artificial intelligence", “deep learning”, and “artificial neural network”. "Machine learning" is most often linked to "risk management", "fintech", and “fraud detection”. In comparison, "artificial intelligence" or “AI”, as a general term, is more commonly associated with "decision-making," "finance", and “financial services”. Whereas, “deep learning”, “artificial neural network”, and “neural language processing”, are generally more linked to “forecasting”.

Based on the analysis presented above, we can conclude that, the top combination of AI applications in finance is “machine learning” with “risk management”, “fintech”, and “fraud detection”. In risk management, ML is mainly used to detect fraud and assess financial risks (Vaiyapuri et al., 2022; Li, 2023). In fintech, ML improves risk management and credit scoring, facilitates credit risk evaluation, and provides personalized financial products tailored to users' needs. It also strengthens fraud detection systems in digital transactions and payments, thereby improving the security of financial operations. Moreover, it is employed to match loans, evaluate borrower credibility, and reduce transaction costs, making financial services more efficient and accessible (Rustandi & Arifin, 2024). ML is also widely applied in fraud detection. These applications enable financial institutions to analyze large-scale datasets, identify meaningful patterns, and build predictive models to enhance customer experiences and ensure the security of financial transactions (Buckley et al., 2021; Biju et al., 2024).

5. Conclusion:

We aimed through this study to obtain an overview of existing literature on AI applications in finance. For this, a total of 193 relevant articles published in the SCOPUS database were reviewed and analyzed to answer the research questions posed at the beginning of the study.

The first finding of this research showed that the number of publications on AI applications in finance has seen a remarkable increase in the recent years, specifically from 2017 to present. This is mainly due to the rapid developments in AI technologies that have greatly impacted many economic sectors, including the financial one, which in turn prompted academic researchers to conduct different studies on this topic.

The other results on the most productive authors and the ten most relevant journals, demonstrate the list of those researchers who have frequently worked on AI in the financial context, and the list of journals specialized in publishing articles in such topic. This could help other researchers in doing more accurate and valuable studies by addressing the research gaps and targeting the most suitable journals to publish their papers.

The findings from this research also showed that “machine learning” has emerged as the most frequently term used in the reviewed literature. This term is often combined with “risk management”, “fintech”, and “fraud detection”. While, "Artificial Intelligence" is more associated with "decision-making," "finance", and “financial services”. Therefore, the combination of ML and risk management has been identified as the most frequently discussed topic in papers that studied AI applications in finance. This also could help researchers to explore relatively new topics by combining other alternative terms from AI and finance areas.

Our research also illustrated that most publications originate from the US, UK, and China, as well as India, Canada, Germany, France, and Italy. This means there have been relatively few such studies conducted in other countries, revealing a gap, which can be addressed in the future by the researchers in those countries.

These findings are considered as full answers to the questions posed at the beginning of this research. They can also offer valuable insights and may serve as a reference for future research on the topic of AI applications in finance.

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