SCCS Perspectives

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January 2024. NO. 2404

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Summary

This paper examines the evolution and transformative impact of Artificial Intelligence (AI) in the world of finance, a sector characterized by being at the forefront of technological innovation. The integration of AI in finance is not a recent development, but the result of an evolutionary process that stretches from the early days of the Internet to the current era of Fintech. The latter, as an amalgam of finance and technology, are radically redefining how we interact with money, improving and automating financial services and processes. This detailed analysis reveals how AI not only optimizes financial operations but also enables financial institutions to anticipate their customers' needs through comprehensive data analysis. This paper provides a comprehensive view of how AI is shaping the future of the financial sector, transforming not only day-to-day operations but also the way we conceive of and relate to finance in our daily lives.

Introduction

The world of finance, always at the forefront of technological innovation, is during a significant transformation driven by the advancement of artificial intelligence (AI). This revolution is not a recent phenomenon; it has its roots in the history of technology and human development. To fully understand the impact and promise of AI in the financial sector, it is essential to look back and see how we got here. Thus, companies in the industry once saw the potential of the Internet for transforming the way people relate to money on a day-to-day basis. The transition from this model to the potential of AI is a natural process that has led to the construction of the broad concept of the so-called Fintech, a sector made up of entities that make use of technology to improve and automate financial services and processes. Entities that think and make decisions even before their customers are aware of their needs, given that the massive data processing contains the micro characteristics of their customers.

AI, in its broadest conception, refers to the attempt to make computers perform tasks that traditionally require human intelligence. This ambition to replicate or simulate human intelligence in machines has a history dating back to the mid-20th century. AI as a concept is attributed to the 1956 "Summer Research Project on Artificial Intelligence" at Dartmouth College, organized by prominent figures such as Marvin Minsky and John McCarthy (Bibel, W. 2014) . This milestone marked the beginning of a journey that has radically transformed both theory and practice in multiple fields, including finance.

The financial sector, known for its rapid adoption of new technologies, was quick to recognize the potential of AI. From automating basic processes to adopting advanced systems for risk analysis and decision-making, AI has found fertile ground in finance. Financial institutions have integrated AI into their operations in a variety of ways, either by developing in-house solutions, outsourcing services, or creating AI-based ecosystems. Undoubtedly, the fact that automation processes can directly affect the annual profit of market participants is a positive incentive for the implementation and development of AI in the financial arena. In this, the participation of consulting firms has been decisive, as they have seen the potential of the technification processes in the analysis of information and cost control, and even in decision-making.

The impetus behind this integration is clear: AI promises not only significant cost reduction but also increased differentiation in the services offered. But these advantages are not without challenges and risks, especially considering the magnitude and complexity of the data involved in financial operations.

The evolution of AI in the financial sector mirrors its overall development. From rule-based systems to deep learning and neural networks, the technology has advanced beyond the rigid methods of the past. Advances in data warehousing and data mining have replaced rule-based systems in complex applications, enabling deeper and more meaningful analysis and personalization.

Today, AI is not just a tool for increasing efficiency in the financial sector; it has become a catalyst for a fundamental redefinition of financial services and strategies and a basis for their differentiation. Its history, deeply intertwined with the development of computing and information technology, is a testament to how technological innovation can reshape entire industries. As we move forward, it is crucial to recognize both the promises and challenges presented by AI, especially in a sector as critical and sensitive as finance.

Development and promise of AI in finance

The adoption of artificial intelligence (AI) in the financial sector has been driven by a series of technological innovations and a strategic response to a financial world characterized by volatility, uncertainty, complexity, and ambiguity (VUCA). These changes have led financial markets and institutions to adapt, increasing their efficiency and productivity and transforming their strategies to become more open and collaborative (Ashta and Herrmann, 2021) enabling them to improve, or at least maintain, their margins in a competitive marketplace.

Personalized Banking and Fraud Prevention: Financial institutions are using AI to personalize services and improve fraud detection. By analyzing large volumes of data, AI

enables a better understanding of user contexts and behaviors, leading to more personalized offerings and more efficient fraud detection (Milana and Ashta, 2021).

Risk Management: Risk management has benefited significantly from the use of AI. Financial institutions can process both structured and unstructured data, improving trading and risk management algorithms. Real-time processing capabilities and machine learning have elevated financial trading outcomes) and prevented impairments to their balance sheets (Baryannis et al. 2019.

Democratization of Financial Services: Fintechs are using AI to offer more accessible and personalized services, extending their reach to a broader customer base, including those in emerging markets.

Responsible Investing and ESG: A significant area where AI impacts is in responsible investing and ESG (*Environmental, Social, and Governance*). With the increase in available data, AI helps investment managers analyze and use this data for more refined approaches to responsible investing.

AI is redefining the financial sector in profound and diverse ways. From improving efficiency and personalization to solving complex challenges such as fraud prevention and risk management, AI provides powerful tools that transform financial markets and institutions. Moreover, its role in promoting responsible and sustainable investments highlights its potential as a tool not only for efficiency but also as a catalyst for positive social and environmental change (Ashta and Herrmann, 2021).

Risks and challenges associated with AI in finance

One of the most significant challenges in implementing AI in the financial sector is the risk of bias and using unrepresentative data. These problems can arise from data selection and processing, where algorithms can perpetuate or even exacerbate existing inequalities. For example, if historical data reflect unconscious biases or discrimination, AI models based on this data could continue to replicate these tendencies. This risk extends from credit decision-making to investment strategies, raising serious ethical and operational concerns (Ashta and Herrmann, 2021).

Handling large volumes of data, especially in real-time, is another critical challenge. AI in the financial sector requires rapidly analyzing and processing huge data sets to be effective, which can be complicated due to the complexity and speed at which data is generated and changed. One example is the case of an Australian bank that failed to report millions of suspicious transactions due to the delay in data analysis.

An often-underestimated risk of AI in finance is the concentration of power in the hands of a few large technology companies, which can lead to market monopolization. This phenomenon could limit competition and innovation and eventually result in less choice and higher costs for consumers. The concern is that large technology companies, with their vast resources and data, could dominate the market, displacing traditional banks and small fintechs.

Overfitting is a significant technical problem in AI models in finance. This occurs when a model is too complex and over-fits the training data, resulting in poor performance on unseen data. In addition, the lack of transparency, often referred to as the "black box"

problem in AI, poses serious challenges, both in terms of trust and legal and ethical liability. The difficulty in interpreting how AI algorithms arrive at certain decisions can be a major obstacle to their adoption and effective regulation (Ashta and Herrmann, 2021).

The challenges associated with AI in the financial sector are as significant as its promise. From handling bias and managing large volumes of data to concerns about market monopolization and algorithm transparency, these challenges require careful attention and consideration by developers, regulators, and users of financial technologies. Addressing these issues effectively is crucial to ensure that the benefits of AI in finance are fully realized without sacrificing fairness, market integrity, or consumer confidence.

In all this, we must assume that the customers of financial services have become the raw material of these entities, where their data, anonymous, can feed the basis of the Big Data with which the systems are trained. This surveillance capitalism, which has arisen in the major technology companies that preside over economic and social activity, increases the danger of assuming that today's society is digitally native when the existing asymmetries are very significant. And it is not so much because of the age bracket we are talking about, but because of the way, we interact with technology by incorporating it or not in our workflow or our daily lives. For some, technology is not a necessary input beyond using the TV remote control, communicating with our cell phone or starting our car. And this is important in the financial sector: the teller window cannot be fully replaced by a "smart" App.

Artificial intelligence and the future of financial markets

The influence of AI on financial markets has been particularly notable in stock trading and investment management. Stock trading, which historically relied on human decisions, has undergone a significant shift to electronic execution, driven by AI algorithms. These changes have increased the speed and efficiency of trading, as well as improved accuracy and reduced operational costs. For example, high trading frequency, driven by algorithms, benefits those who can guarantee the lowest latency in a network ecosystem, demonstrating how AI can offer competitive advantages in financial markets.

AI is also revolutionizing risk management and trading by improving the ability to handle structured and unstructured data. This allows trading institutes and clients to improve their algorithms, managing both the frequency and quality of trading. The ability to analyze stock performance in real-time and the automatic adaptation to new data are key aspects that highlight the usefulness of AI in this field.

One notable change in the investment industry is the increased adoption of AI-managed passive funds. These funds, which charge much lower fees than actively managed funds, are gaining popularity for their ability to match or beat market returns. AI has enabled these funds to operate with greater efficiency and accuracy, leading to a shift in client preference from active to passive funds.

AI is also facilitating greater personalization and segmentation in the financial market. By using AI to analyze customer behavior patterns and preferences, financial institutions can offer more personalized products and services. This translates into greater customer satisfaction and better alignment of financial products with individual needs.

AI is reshaping the future of financial markets in several significant ways. From the transformation of stock trading to the revolution in risk management and investment, AI is playing a crucial role in improving efficiency, accuracy, and personalization in the financial sector. However, these advances must be managed to ensure that the benefits are equitable and the associated risks, especially in transparency and fairness, are adequately addressed. The continued evolution of AI in the financial sector promises not only changes in how transactions are conducted but also in how financial services in general are conceptualized and approached.

AI in microfinance: innovation and social responsibility

In microfinance, particularly in developing countries, AI is facilitating significant change. Traditionally, high transaction cost versus small loan size has been a major challenge in this sector. AI, through the analysis of behavioral and transactional data, is enabling microfinance institutions to reduce these costs and improve accuracy in credit assessment, helping to expand financial inclusion in emerging economies.

Credit assessment has undergone a significant evolution with the incorporation of AI. Financial institutions are using data from social networks and payment patterns to assess the creditworthiness of borrowers. Platforms such as Kreditech or ID Finance, for example, use information from Facebook and LinkedIn to score loan applicants, offering microloans based on these analytics. It is at this point where Zuboff's (2020) surveillance capitalism takes center stage and generates an indescribable vertigo of the information we give for free not to social networks, but to the very company that finances us.

AI is also transforming mobile banking, a key component in microfinance. Digital transactions generate a wealth of data that can be analyzed to better understand clients. This not only improves the operational efficiency of microfinance institutions but also helps integrate more people into the formal financial system, reducing financial informality.

The integration of AI into the microfinance sector represents an era of innovation and social responsibility. By improving credit assessment and reducing transaction costs, AI is facilitating wider access to financial services in developing economies. In addition, its ability to process and analyze large volumes of data is enabling a more personalized and efficient approach to mobile banking and microfinance. This technology must be implemented ethically and responsibly, ensuring that the benefits of AI reach the communities most in need and contribute to financial inclusion. But beware. Access to fintech services is going to depend heavily on technology companies, and we can turn these entities into the real competitors of financial institutions. Google and Meta can use the data "stolen" from their customers to exploit their licenses to operate as financial institutions.

Given their global nature and the potential systemic effect of these entities, the concept of Too Big to Fail may become too big to fail for central banks or financial market supervisors.

Possible scenarios in an AGI environment

With the possibility of the arrival of AGI (Artificial General Intelligence), a type of artificial intelligence with the ability to understand, learn, and apply its intelligence to many human problems, the financial sector could undergo more profound transformations. Experts in the field do not rule out the possibility of reaching superintelligence or even singularity in the coming decades, which could have significant implications for the financial market. These advances could lead to even more advanced automation, more efficient decision-making, and possibly new business models.

The advent of AGI raises important ethical, social, and security issues. For example, data privacy and security become even more critical in an environment where AI processing and analysis capabilities are exponentially greater. In addition, concerns about the concentration of power and control in the hands of a few corporations or entities that own AGI technology intensified. This could lead to scenarios where major financial decision-making is dominated by AGI systems, raising questions about human autonomy and control over global economic systems.

AGI could also have a profound impact on the structure of labor and the global economy. While it could create opportunities for highly skilled and technical jobs, there is also the risk of a significant decrease in demand for middle- and lower-level jobs, exacerbating problems of inequality and labor displacement. In addition, the ability of AGI to perform complex tasks and make decisions could redefine traditional roles in the financial sector, from analysts to financial advisors.

The potential arrival of IGA in the financial sector opens a landscape of possibilities and challenges. From the transformation of business models and operations to the profound ethical and social implications, AGI could radically change not only how financial institutions operate, but also the role they play in society and the economy at large. Preparing for these changes, both in terms of technological development and in terms of policy and regulation, will be crucial to ensure that the transition to an AGI environment is beneficial and equitable. The key will be to balance technological innovation with careful consideration of the ethical and social implications involved (Ashta and Herrmann, 2021). Schumpetter's creative destruction may be dramatic in the short term and socially unmanageable, being somewhat more disruptive than the shift from typewriter to computer, given the patterns and temporal pace of technology deployment. The fear of AI taking our jobs may not arise from someone else using it in their day-to-day life taking our jobs, but even that person being replaced by AGI.

Conclusion

The integration of artificial intelligence (AI) into the financial sector presents a landscape of significant opportunities and risks. From process automation and service personalization to the revolution in risk management and investment, AI is redefining the industry in profound ways. Innovations in microfinance and the possibility of IGA promise even more radical transformations, with the potential to reshape the structure of work and the global economy.

However, these advances are not without challenges. Risks associated with AI, such as data biases, lack of transparency in algorithms, and concentration of power, require careful attention. In addition, the potential advent of AGI raises fundamental ethical and social issues that the financial sector and society must address.

The development and implementation of AI in finance must be conducted ethically and responsibly. This involves not only ensuring the accuracy and efficiency of AI systems but also addressing the social and ethical impacts of these technological advances. Appropriate regulation and oversight are critical to ensure that the benefits of AI are equitable and do not exacerbate existing inequalities.

In addition, greater collaboration between technology developers, financial institutions, regulators, and other stakeholders must be fostered to create a financial AI ecosystem that is innovative, fair, and transparent. Education and training will play a crucial role in preparing the workforce for the changes that AI will bring to the industry.

AI has the potential to transform the financial sector in ways we are only beginning to understand. Its proper implementation could lead to a more efficient, inclusive, and responsible sector. However, to achieve this potential, a balanced approach that considers both technological innovation and social responsibility is imperative. In doing so, we can ensure that advances in financial AI are not only a win for efficiency and profitability, but also for equity, inclusion, and social welfare.

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