IJCSIT
International Journal of Computer Science & Information Technology
ISSN: XXXX-XXXX / Volume 1 Issue 1 January-March 2025 / Page No: 1-8
Paper Id: IJCSIT-V1I1P101

Original Article

A Comparative Survey of Artificial Intelligence Applications in Finance

Nkolo Rove Bekono[1], Dr. Ahmed Nabih Zaki[2]
[1]*UG Scholar, Department of Data Science and Artificial Intelligence,Leiden University, Netherlands.*
[2]*Department of Computer Science,University of Malaya, Malaysia.*

Received Date: 03 January 2025 Revised Date: 28 January 2025 Accepted Date: 15 February 2025

Abstract: *Artificial intelligence (AI) has profoundly revolutionised the financial industry by improving customer service, cutting running expenses, and increasing security. Artificial intelligence finds use in a wide range from automated trading to fraud detection to robo-advisory services to risk management underwriting, credit scoring, and regulatory compliance. Financial firms have been able to get real-time, actionable insights from vast volumes by aggregating machine learning (ML), natural language processing (NLP), computer vision, and robotic process automation (RPA). Furthermore enabled by artificial intelligence are creative financial goods, improved financial procedures, and hyperpersonalized customer experiences. Artificial intelligence also enables real-time financial transaction monitoring feasible, enhances anti-money laundering (AML) systems, and supports predictive analytics for income projection. Moreover helping ESG (Environmental, Social, Governance) analysis by means of AI-driven solutions are streamlining supply chain financing efficiency and corporate audit processes. Notwithstanding its significant benefits, the use of artificial intelligence in banking also raises important issues of data privacy, algorithmic bias, explainability, and the need of robust rules. This paper presents a comparison of artificial intelligence applications in numerous financial sectors: banking, investment, insurance, and financial advice services. By means of study of the technologies, use cases, benefits, and challenges, this assessment stresses the existing impact, maturity level, and future potential of artificial intelligence in banking.*

Keywords: *Artificial Intelligence, Machine Learning, Financial Services, Banking, Investment Management, Fraud Detection, Credit Scoring, Risk Management, Financial Advisory, Natural Language Processing, Robotic Process Automation, Financial Rules, Data Privacy, Algorithmeric Bias, Customer Experience, Regulatory Compliance.*

I. INTRODUCTION

Naturally complex and driven by data, the financial industry depends on an ongoing data flow to manage risks and guide choices. Conventional analytical techniques have become insufficient given the exponential rise in data volume, speed, and diversity. Predictive analytics, real-time processing, and automated decision-making among other things have made artificial intelligence (AI) change data use in finance. Artificial intelligence technologies include machine learning (ML), natural language processing (NLP), computer vision, deep learning, and robotic process automation (RPA) now increasingly rely on financial institutions trying to remain competitive and flexible in a fast-changing market. Among the various applications these technologies support are intelligent document processing, anomaly detection, loan default prediction, customer segmentation, and chatbots for customer care. Artificial intelligence also aids regulatory technology by means of efficient administration of audit trails, compilation of regulatory reporting, and automation of compliance monitoring (RegHub). Furthermore, artificial intelligence is also crucial in cybersecurity since pattern recognition and behavioural analytics help to identify and respond to potential risks. Artificial intelligence (AI) aids in wealth management to be hyperpersonal by customising financial advice to meet personal goals and preferences using behavioural data and life event modelling. Credit card issuers use artificial intelligence to look at credit limit changes and fraud warning trends. The development of quantum computing promises to speed up artificial intelligence computations, hence enhancing its capability in financial simulations and high-frequency trading. Moreover bringing new elements in safe transactions and smart contracts is the mix of artificial intelligence with blockchain technology. Artificial intelligence also makes real-time supply chain finance optimisation, dynamic pricing systems, and more accurate actuarial modelling in insurance conceivable. However, depending more on artificial intelligence brings ethical use, model interpretability, data security, and conformity to evolving legal criteria issues. Financial firms have to combine risk with innovation to produce open, fair, and responsible artificial intelligence platforms. This paper provides knowledge of the maturity, prospects, and limitations of artificial intelligence by exploring its relative application in significant financial sectors: banking, investment management, insurance, and financial advising services. The course of finance will be determined in great part by the way artificial intelligence grows, not merely in importance but also quite absolutely necessary. Since banking has always been a data-intensive industry, the development of artificial intelligence permits institutions to process massive amounts of data with hitherto unheard-of speed

and accuracy. Artificial intelligence technologies like robots, computer vision, natural language processing (NLP), and machine learning (ML) are being increasingly applied in finance. This paper tries to assess in many financial domains the efficiency and limitations of artificial intelligence applications.

II. AI IN BANKING

Banks have gradually embraced artificial intelligence technologies to remain competitive in a fast changing digital world, improve efficiency, raise customer happiness, and reduce operational risk. Among the most effective applications for artificial intelligence-powered fraud detection—where machine learning models continuously learn from massive transactional datasets to spot anomalies and flag suspicious activity in real time—are those related to this technology. Artificial intelligence is also altering credit scoring and thereby enabling financial inclusion for those who have never banked by evaluating creditworthiness using non-traditional data sources including mobile phone usage, social media activity, and utility payment records. By handling complex questions using natural language comprehension and sentiment analysis, AI's intelligent chatbots and virtual assistants reduce wait times and improve user experience by thereby transforming customer care. Robotic Process Automation (RPA) saves a lot of time and money by streamlining regular operations such KYC (Know Your Customer), compliance reporting, and account reconciliation. Artificial intelligence also finds utility in dynamic pricing of financial products based on real-time consumer behaviour and market conditions. Moreover, artificial intelligence technologies support anti-money laundering (AML) projects by spotting complex laundering trends typically avoided by rule-based systems. Due diligence automation, sentiment analysis of financial disclosures, and merger and acquisition projections all find use for artificial intelligence models in investment banking. Predictive analytics that find credit and market risks lets artificial intelligence assist risk management by way of proactive mitigating strategies. Banks also utilise artificial intelligence for tailored financial recommendations, focussing on customers with customised offers depending on life events, expenditure pattern, and financial goals. By always tracking conversations and transactions for proof of policy violations or misbehaviour, artificial intelligence supports internal audit and compliance. AI-driven systems offer cash flow projection and liquidity management by means of analysis of inflows, outflows, and external market factors. Artificial intelligence also speeds document validation and fraud detection in trade finance, therefore removing hurdles and improving transaction turn-around times. Some banks use computer vision, using facial recognition, to automatically confirm identity during account opening processes. The confluence of artificial intelligence and Internet of Things (IoT) opens even more opportunities for predictive maintenance of ATM networks and branch infrastructure. As open banking gains traction, artificial intelligence helps banks to creatively develop customer-centric services by more effective use of outside data. Notwithstanding these advances, challenges still persist including model interpretability, data governance, and algorithmic fairness. Regulating authorities are also stepping in more, which drives banks to employ explainable artificial intelligence models supporting decision-making processes. All things considered, artificial intelligence is turning banking into a more intelligent, flexible, customisable environment with enormous benefits but needing stringent regulation and ethical use. integrated artificial intelligence for several purposes.

Fraud Detection Machine learning (ML) algorithms are very crucial in enhancing fraud detection systems in banking by real-time analysis of transactional data in order to identify aberrant trends and stop fraudulent behaviour before they spread. These algorithms generate models from historical transaction data using supervised learning techniques by learning the features of both normal and fraudulent activity. As new fraud techniques emerge and the system gets more accurate over time differentiating between legal and illicit behaviour, it adjusts to them. AI-based fraud detection systems can incorporate a wide spectrum of data sources like consumer location, device fingerprinting, and transaction velocity in order to raise accuracy even more. Moreover able to detect minute patterns maybe ignored by traditional rule-based systems are deep learning techniques. Moreover, artificial intelligence systems can monitor every transaction and spot maybe fraudulent ones for human investigation, thereby sparing a lot of time and money on hand-made inspections. Using unstructured data analysis—that of customer correspondence—natural language processing (NLP) significantly enhances fraud detection by means of indicators of phishing attempts, social engineering, or account takeover. Furthermore, artificial intelligence included into fraud detection systems offers dynamic risk scoring, in which case AI dynamically alters the degree of investigation for every transaction in real time relying on contextual data and historical activity. This generates a more quick and effective fraud detection system that can control high-frequency trading and major transactions while limiting false positives and thereby improve the user experience. Notwithstanding their efficiency, problems still exist regarding the fairness and transparency of artificial intelligence models as well as inclusivity and accuracy of fraud detection systems depending on the control of any bias in training datasets.

Credit Scoring AI enhances traditional credit scoring models and consequently provides more accurate and inclusive assessments of a borrower's creditworthiness by including a larger spectrum of data sources and forecasting tools. While artificial intelligence improves this by using various data sources including utility payments, social media activity, and mobile phone use, conventional credit scoring mainly rely on prior financial data including credit history and income. This allows

artificial intelligence algorithms to assess those without traditional credit histories, therefore opening credit availability to underbanked or unbanked populations. More so than conventional models, artificial intelligence models also use machine learning techniques to identify complex trends in a borrower's financial behaviour, therefore forecasting future credit risk. For example, deep learning methods can identify latent signals and assess vast amounts of data from various sources, hence improving the accuracy of credit risk assessments. Furthermore, artificial intelligence-driven credit scoring systems could dynamically change to fit individual behaviour in real time and evolving economic conditions, hence enhancing their accuracy and flexibility. Artificial intelligence systems learn from fresh data constantly and are therefore more responsive to changes in borrower behaviour or market conditions than conventional models that demand regular updates. Another significant advantage of artificial intelligence in credit rating is dynamic risk-based pricing. AI systems assess a person's creditworthiness not just in terms of risk but also the possibilities for loan payback, therefore allowing financial institutions to offer more tailored interest rates and lending terms dependent on real-time data. Notwithstanding these advances, credit rating based on artificial intelligence violates algorithmic bias, openness, and data privacy. Meeting ongoing demand depends on AI models being responsible, explainable, free from racial or gender bias. Therefore, financial companies using artificial intelligence for credit scoring have to follow rigorous data governance standards and operate inside the context of evolving rules to guarantee moral and fair application of artificial intelligence technology.

Customer Service Chatbots and virtual assistants powered by AI are revolutionizing customer service in the banking and financial services industry by offering 24/7 support and improving the overall customer experience. AI-powered chatbots leverage natural language processing (NLP) and machine learning (ML) algorithms to engage with customers in real-time, resolving inquiries, providing product information, assisting with account management, and even helping to complete transactions. These AI systems can handle a large volume of customer queries simultaneously, reducing wait times and operational costs, while improving efficiency. By learning from previous interactions, chatbots continuously improve their responses, offering more accurate and personalized assistance over time. Additionally, AI chatbots are capable of handling more complex tasks such as troubleshooting technical issues, providing financial advice, and guiding customers through intricate procedures like loan applications or investment strategies. The integration of sentiment analysis allows these systems to assess customer emotions and adjust responses accordingly, enhancing user satisfaction. Moreover, chatbots can be integrated with other digital tools, such as voice assistants and mobile apps, enabling a seamless cross-channel customer experience. Despite these advantages, the use of AI in customer service is not without challenges, including ensuring that chatbots understand the nuances of customer queries, maintaining a human-like conversational tone, and addressing issues related to data privacy and security. While AI chatbots are increasingly effective in handling routine tasks, there remains a need for human agents to step in for more complex, sensitive, or escalated situations, ensuring a balance between automation and personal touch.

Process Automation Driven by artificial intelligence, chatbots and virtual assistants are revolutionising customer service in the banking and financial services industries by providing 24/7 help and improving the complete client experience. AI-powered chatbots communicate with customers in real-time, answer enquiries, provide product information, manage accounts, and even assist to close transactions using natural language processing (NLP) and machine learning (ML) technologies. These artificial intelligence systems can manage many client questions concurrently, therefore reducing wait times and operational costs even as they improve efficiency. By learning from past interactions, chatbots continuously improve their responses, therefore offering more exact and customised help over time. Artificial intelligence chatbots can also do more challenging tasks such technical issue debugging, financial advice, and consumer coaching via convoluted processes like loan applications or investment plans. These systems assess consumer attitudes and change responses using sentiment analysis, hence increasing user satisfaction. Moreover, chatbots can be linked with other digital tools, such voice assistants and mobile apps, so enabling a perfect cross-channel customer experience. Notwithstanding these advantages, applying artificial intelligence in customer service poses challenges include making sure chatbots understand the nuances of consumer concerns, preserve a conversational tone human-like, and handle issues with data privacy and security. Human agents are still needed to cover more complex, delicate, or escalated events so that automation and human touch are in harmony even if AI chatbots are getting more and more efficient in managing daily chores.

The banking sector is adopting robotic process automation (RPA) more and more to streamline time-consuming, monotonous tasks, therefore fostering operational efficiency and reducing human error. RPA frees staff people to focus on more strategic and value-adding tasks by executing rule-based chores such data entry, reconciliation, compliance checks, and report generating utilising software robots. In the banking sector, RPA is particularly successful in automating back-office tasks such account opening, transaction processing, and fraud detection, therefore enabling faster response times and improved customer service. Artificial intelligence can also be used with RPA to create intelligent automation systems whereby cognitive abilities and machine learning algorithms enable more challenging tasks such exception management and decision-making. This combination helps operations to grow, saves operational costs, and improves accuracy in challenging

operations. In regulatory compliance, where it lets financial companies automatically change systems in line with changing regulations, therefore ensuring compliance and reducing the possibility of human mistake. Notwithstanding its main benefits, RPA also brings challenges like system integration, the need of continuous monitoring, and the threat of job displacement in specific areas. Companies who continue employing automation technologies have to balance the efficiency gains with the need to upskill employees and maintain a human touch in crucial decision-making processes.

III. AI IN INVESTMENT MANAGEMENT

Artificial intelligence (AI) has changed investment management by offering innovative ideas that improve decision-making, simplify portfolio management, and increase general financial performance. One of the primary applications is algorithmic trading, in which AI-powered computers search vast amounts of market data and execute deals at optimal times depending on real-time data like price movements, market trends, and economic factors. By applying machine learning (ML) to detect trends and patterns, therefore projecting future market movements and helping traders maximise returns by reducing risks. Moreover, artificial intelligence-powered trading algorithms are able to adapt to shifting market situations, thereby ensuring that approaches remain profitable even in chaotic surroundings.

Portfolio management is another field where artificial intelligence is really crucial. Customised investing strategies are produced by AI-driven robo-advisors by analysing individual risk profiles, financial goals, market situations. These advisers continuously adjust portfolios based on real-time market data, therefore maximising asset allocation and lowering risk. Furthermore ensuring a more strong portfolio fit for resisting market volatility is machine learning methods by assisting to identify opportunities for diversification.

Still another important usage is market sentiment analysis motivated by natural language processing (NLP). Artificial intelligence algorithms assess market sentiment by means of news article, social media post, earnings report analysis, and other textual data sources, therefore providing insights on investor activity and the more general market mood. Artificial intelligence (AI) can find trends or sentiment changes in massive amounts of unstructured data that might not be immediately obvious using more traditional methods via processing. This forces investors to rethink their strategies and make better judgements.

Artificial intelligence also aids with risk management by looking at large databases and past trends to project probable market losses, portfolio dangers, and asset volatility. This enables investors choose with more knowledge and act ahead to minimise potential losses. Predictive analytics driven by artificial intelligence improves forecasting as well, therefore enabling investment managers to make wise judgements based on patterns in the future market.

Moreover, artificial intelligence enables more efficient backtesting of investment strategies by helping businesses to test their models and maximise approaches relying on previous success before applying them in real markets. This helps reduce the chance of human error and guarantees that investment plans are strong before application.

These advances however complicate the application of artificial intelligence in financial management. Automated trading calls for attention in algorithmic openness, data security, and ethical issues. Moreover, even if artificial intelligence may help with decision-making, human supervision is still absolutely essential to ensure that models are running as intended and to take into account unanticipated market changes that AI systems might not entirely forecast.

Still, as more complicated and profitable investment strategies made feasible by continuous machine learning and data analysis progress, artificial intelligence's impact in investment management is projected to grow.

IV. AI IN TRANSFORM

underwriting and claims processing to fraud detection and customer service, artificial intelligence (AI) is transforming many aspects of the business and growing ever more significant. One of the key applications is underwriting since artificial intelligence systems assess the risk level of possible policyholders by means of massive data analysis covering customer behaviour, prior claims, and outside risk factors. By use of predictive analytics and machine learning (ML), insurance companies may establish more accurate risk assessments, therefore ensuring that underwritten risks are under control and policies are reasonably priced.

Artificial intelligence is also enabling the claims processing process to be automated. Artificial intelligence systems can quickly evaluate claims by means of natural language processing (NLP), computer vision, by extracting information from entered documents—such as images or text—such as images or text and matching it with historical data to identify discrepancies or mistakes, so lowering expenses and raising customer satisfaction by means of this.

By seeing in claims data unusual trends and behaviours, artificial intelligence also helps to detect fraud. Machine learning models are increasingly valuable in preventing fraud over time since they are supposed to learn from new data

constantly. Trained to detect anomalies and highlight possible fraudulent behavior—such as fake claims or overstated damages—they are more and more useful in preventing fraud over years.

Artificial intelligence-powered chatbots and virtual assistants have become very popular in the insurance industry for customer care if one wants customers 24/7 support. These artificial intelligence systems may handle routine enquiries, assist consumers with policy changes, respond to coverage questions, and help claims be filed. Reducing the need for human intervention and providing real-time support helps insurers to raise customer involvement and reduce running costs.

Moreover, artificial intelligence (AI) allows tailored insurance products by means of data analysis of unique client information, thereby generating plans that fulfil specific needs of policyholders. This ability to offer customised solutions not only increases client satisfaction but also helps to recruit and retain insurers using this capacity.

At last, artificial intelligence is allowing insurance firms to maximise their pricing policies, track trends, and project future claims. By means of past claims data, weather patterns, and economic indicators, AI approaches can expose future hazards; so, insurance companies can act early to lower losses.

Notwithstanding these advancements, applying artificial intelligence in insurance brings problems including data privacy concerns, algorithmic bias, and legal compliance requirements. Artificial intelligence's ongoing success in the insurance industry hinges on ethical issue resolution and openness in AI decision-making process. Still, by offering great efficiency, accuracy, and customer satisfaction increases, artificial intelligence has already transformed insurance.

V. AI IN FINANCIAL ADVISORY SERVICES

By providing both customised, data-driven recommendations for people and companies equally, artificial intelligence is transforming financial advisory services. One of the key benefits is the chance to offer quite tailored advice. Artificial intelligence systems use modern machine learning algorithms to examine a client's financial history, risk tolerance, spending behaviour, and life events, so producing customised financial strategies. These systems can also project future financial needs including retirement planning, college tuition, or major life events.

Artificial intelligence is also considerably improving financial planning tools by using predictive analytics to reproduce a spectrum of possible outcomes for different financial circumstances. These tools let consumers examine the results of numerous possibilities as saving for retirement, buying a house, or investing in the stock market, so helping them to make smarter decisions. In terms of portfolio management, artificial intelligence-driven algorithms dynamically alter asset allocation depending on real-time market data, therefore enhancing the investment strategy to fit the evolving risk profile of the client. These artificial intelligence technologies ensure that portfolios remain in line with the financial objectives of the customer even in the presence of market volatility by way of continuous education and adaptation.

Another quite important application of artificial intelligence in financial advisory services is client risk profiling. Artificial intelligence can create more dynamic and accurate risk profiles by using behavioural data including transaction history, social media activity, and personal preferences while traditional risk assessment methods can depend on static questionnaires or subjective judgement. These profiles give more relevant advice and let advisers design investment strategies more in accordance with the unique needs and aspirations of the client.

AI-driven chatbots and virtual assistants, which provide consumers 24/7 help and quick responses to questions about investing, retirement planning, insurance, and other financial issues, are being used increasingly by financial advisory firms. Automating simple queries helps financial advisers focus on more challenging issues, therefore enhancing the total customer experience.

Still another field where artificial intelligence is impacting is automated document processing. AI-powered systems can examine vast volumes of financial records—including tax returns, bank statements, and insurance policies—to extract relevant data and show it in a more appetable form for clients and advisers alike. This guarantees more accurate data, saves a lot of time, and helps to reduce hand-written data entering errors.

VI. COMPARATIVE ANALYSIS

While artificial intelligence (AI) has revolutionised many different financial sectors, industry needs and operational challenges define the degree of adoption and efficacy. In credit scoring, customer service, regulatory compliance, and fraud detection, artificial intelligence has evolved quite firmly into a part of banking. Banks are looking at transaction patterns, fraud detection, and risk assessment enhancement—all of which helps reduce losses and increase client confidence—using artificial intelligence. More dynamic and precise credit scoring models generated by using machine learning (ML) approaches have improved lending decisions and lower risk. But in some places problems including data privacy and legacy system complexity have prevented complete integration.

Artificial intelligence finds use in investment management mostly in sentiment analysis, algorithmic trading, and portfolio optimisation. Wealth management firms have adopted artificial intelligence to support decision-making by looking at market trends and customising investment portfolios to meet personal risk profiles. Automated portfolio management solutions provided by AI-powered robo-advisors are less costly than traditional advisory methods and hence open financial services to a greater audience. Natural language processing (NLP) approaches utilised to assess market sentiment from news articles, financial information, and social media help to further improve decision-making processes. Still challenging are maintaining the interpretability of AI models in environments of high frequency trading and ensuring openness in decision-making.

Adopting artificial intelligence, the insurance sector has been able to improve underwriting accuracy, fraud detection, claim handling, and customer service. Machine learning algorithms enable insurers more precisely evaluate risks by analysing massive amounts of data from multiple sources—including customer behaviour, external events, and past claims data. AI-powered chatbots provide 24/7 customer service by assisting consumers with insurance questions and claims, therefore improving customer experience while reducing running costs. Still unsolved, though, are issues with data security, algorithmic bias, and regulatory compliance for the general use of artificial intelligence in insurance.

Artificial intelligence is changing financial advise delivery in financial advisory services. Artificial intelligence systems search consumers' financial behaviour, risk tolerance, and personal goals in order to provide customised recommendations. Robo-advisors and AI-powered technologies provide asset allocation and portfolio management by means of real-time data, hence improving investment strategies. Furthermore producing regulation updates, artificial intelligence-powered regulatory technology (RegTech) is automating compliance, so reducing non-compliance risk. Artificial intelligence has immense potential in financial advisory services; yet, if we are to fully appreciate its benefits, problems with data privacy, algorithmic openness, and reliance on AI for crucial decision-making must be addressed.

Among these sectors, data protection and security, ethical use of artificial intelligence, openness in AI-driven judgements, and robust legislative frameworks to manage AI systems stand as common challenges. Although artificial intelligence has shown to be helpful in improving efficiency, lowering expenses, and providing creative ideas, its quick acceptance calls for addressing issues with bias, responsibility, and model explainability to guarantee fair and ethical usage all around the financial sector. As these challenges are overcome, artificial intelligence becomes increasingly likely to change the financial sector.

Key challenges include:

- Data Privacy: Ensuring compliance with data protection regulations.
- Bias in Algorithms: Addressing fairness and accountability in AI decision-making.
- Integration Complexity: Merging AI with legacy systems remains a hurdle.

VII. CONCLUSION

Artificial intelligence is revolutionising the financial sector by means of improved efficiency, precision, and smart decision-making across numerous financial sectors—including banking, investment management, insurance, and financial consulting services. As artificial intelligence technologies—machine learning, natural language processing, robotic process automation—develop their capacity to automate challenging tasks, foresee outcomes, and offer customised financial solutions rises rapidly. Artificial intelligence has been particularly helpful in fields including fraud detection, credit scoring, risk management, and regulatory compliance, so improving decision-making by letting financial institutions provide faster, more effective services while lowering running costs and raising client satisfaction. Analysing enormous volumes of data in real time has been especially important.

Notwithstanding these significant advances, the application of artificial intelligence in many different spheres still poses challenges, particularly in connection to data privacy, algorithmic bias, and openness of decision-making. The financial industry's reliance on artificial intelligence systems raises issues regarding ethical application of algorithms, justice in decision-making, and the need of robust legislation to regulate AI-driven activities. Dealing with these challenges will help to sustain the success and public acceptance of artificial intelligence technology in banking.

Artificial intelligence has significant future prospects in the financial sector. AI's ability to offer hyper-personalized client experiences, maximise financial operations, and enable new financial products will help to define the sector going forward. Artificial intelligence will allow financial organisations increasingly to innovate, reduce risk, and improve service offerings as it advances. To fully achieve artificial intelligence, however, financial firms must carefully navigate ethical and regulatory concerns such that AI systems remain open, fair, and accountable. The trajectory of artificial intelligence in finance will depend on the sector's capacity to reconcile technical innovation with responsible and ethical application, so creating an environment whereby AI benefits consumers as well as companies.

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