Journal of Global Research in Electronics and Communication
Volume 2, No. 1, January 2026
Available Online at: www.jgrec.info
RESEARCH PAPER

A Review Of Generative Ai Applications In Financial Advisory Services: Current Developments, Limitations, And Opportunities

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***Abstract*—Artificial Intelligence (AI) has become a digital transformation platform in any industry now, and Generative Artificial Intelligence (GAI) is among the most substantial developments. Compared to older AI systems, which are focused on classification and prediction, GAI has the unique ability to generate original and valuable data and content, including text, images, and financial simulations. GI is transforming the way business activities are conducted in the financial sector by enhancing automation, accuracy, and customization. This synergistic effect of the two enables financial institutions to conduct complex tasks, such as portfolio optimization, risk prediction, fraud detection, and real-time market analysis, more efficiently and with greater accuracy. Financial advisory services have a particular advantage in capitalizing on GAI's capacity to offer client-specific investment recommendations, an automated decision-support system, and flexible insights tailored to client profiles and market conditions. Ethical governance, model transparency, computational costs, and data privacy pose challenges to the adoption of GAI. To eliminate these limitations, explainable AI (XAI), regulatory compliance, and human-AI collaboration should be enhanced. The paper investigates the advances, uses, constraints, and prospects of GAI in the world of finance, particularly in financial advisory services. The findings suggest that GAI will continue to transform financial processes and create a new paradigm in which human skills and AI intelligence will work together to drive innovation and sustainable value generation.**

Keywords—Generative Artificial Intelligence (GAI), Financial Advisory, Explainable AI (XAI), Regulatory Compliance, Financial Technology, VAEs.

I. Introduction

A specific kind of artificial intelligence (AI) technology known as "generative AI" (GAI) may create text, photos, audio, and synthetic data, among other kinds of material. The recent debate over GAI has been stimulated by the ease of producing high-quality text, images and movies in a few seconds using the new user interfaces. It is necessary to note that the technology is popular. Chatbots had used GAI as early as the 1960s. Nevertheless, until 2014, when generative adversarial networks (GANs), a machine-learning (ML) technique, were created, GAI could not generate compelling image, videos and audio for users[1][2]. The popularity of GAI has been greatly influenced by recent developments such as Transformers and the language models they enabled. ML tools called transformers allow researchers to train ever-larger models without previously classifying all the data. As a result, more detailed answers might be obtained by training new models on more pages of text[3][4]. Additionally, Transformers made it possible for models to track the connections between words over entire pages, chapters, and books rather than just individual sentences by unlocking a special idea called attention. Moreover, the transformers had the ability to examine code, proteins, chemicals, DNA, and sentences based on their ability to follow the relationships.

From the standpoint of the financial sector, GAI makes a substantial contribution to the growth of autonomous finance[5]. The phrase autonomous finance is used to refer to Financial services automation using AI and hyper-automation, decision-making and operations [6][7]. Increasingly popular in financial institutions and organizations, autonomous finance has the potential to enhance the productivity, reduce the operating costs, and enhance customer experiences in an organization. An autonomous financial function may make decisions based on the data it gathers and use technologies like self-learning and self-correction that go beyond conventional automation. For example, Open AI-powered chatbots are used by firms like Morgan Stanley to help clients and financial professionals[8][9]. These chatbots can assist users by giving them specific information by using internal data sets and research collections as knowledge sources [10]. Additionally, Bloomberg launched the Bloomberg Generative Pre-trained Transformer (GPT), a generative model tailored to the banking industry that may help with financial activities.

A. Structure of the Paper

The structure of the paper is as follows: Section II provide an introduction to Generative AI (GAI), Section III is that of the role of GAI in financial advisory services, Section IV is the analysis of major applications in the financial industry, Section V is the discussion on limitations and work in the future, Section VI is the discussion of the emerging opportunities, Section VII is review of related literature, and Section VIII is the summarization of findings and future work.

II. Overview Of Generative Artificial Intelligence (GAI)

GAI offers a variety of inputs to assist users in producing new material in several forms. This is not the same as classical AI, which makes predictions and classifications based on data that has already been collected[11][12]. Textual information in the form of voice and images, including essays, articles, and inquiries, can be used as inputs and outputs for this model. Patterns discovered during training are replicated in new data instances. Figure 1 provides several instances of GAI models.

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The results are produced using a variety of unsupervised or semi-supervised ML methods. This has made it possible for companies to quickly create foundation models from a large amount of unlabeled data [13]. AI systems that may be used in many ways can be built using these core concepts. These GAI models create patterns and fresh creative material by applying neural networks, such as the ones described above, to current data.

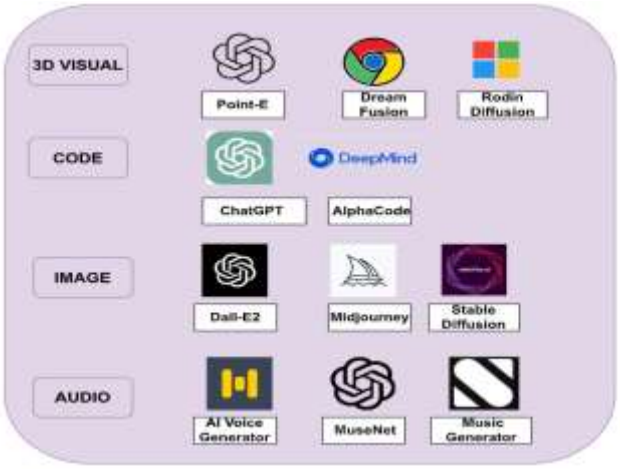

Fig. 1. GAI models.

Some examples of GAI include ChatGPT [14], DALL-E, Bard, Bloomberg GPT, and so forth. Depending on the user's prompts and dialogues, they might provide output in the form of text or pictures. GAI has become more well-known as a result of its many uses and promise to increase efficiency and production across a variety of industries [15]. Academic writing, composition, dubbing, picture editing, architectural rendering, and other tasks may all be accomplished using GAI [16]. Efficiency is the most convincing benefit of applying GAI in various sectors.

GANs: GANs have been a key tool in the field of AI since they have made it possible to generate realistic data in a variety of fields [17]. It features a special structure that makes it appropriate for data generation using the generator and discriminator neural networks[18].

VAEs: A VAE is a GAI technique based on deep learning (DL) to create new information, identify anomalies, and remove noise. VAEs are not only very useful in the analysis of financial feeds, but also biological signals like EEG or IoT data streams [19]. when it comes to signal analysis. As well, they are applicable to the creation of artificial time series data, which has been employed to train other AI systems.

A. Need of Generative AI in Finance

GAI is a product whose invention can revolutionize the banking industry through proper adaptations. It offers a variety of advantages and possibilities that have the potential to change several facets of financial operations[9]. Table I presents special benefits and capabilities for companies and organizations that are trying to implement it in their operations[20]. In the case of a hybrid approach of combining workforce and AI, GAI is better suited to perform some operations, and some processes will bring better outcomes. Although the method used depends on the tasks at hand, several characteristics that distinguish GAI from alternative methods are:

TABLE I. ADVANTAGES AND DISADVANTAGES OF GAI IN FINANCE

Aspect	Advantages	Disadvantages
Data Efficiency	Can produce artificial financial data, eliminating the requirement for big, authentic databases.	The intricacies of real-world financial data might not be fully captured by synthetic data.
Model Complexity	Ability to simulate intricate financial patterns and systems.	The models' intricacy makes them difficult to understand, creating a "black box" problem.
Accuracy	High predictive accuracy for many tasks, such as fraud detection and stock prediction.	High-accuracy models could perform poorly in the actual world if they overfit the training set.
Adaptability	Can more swiftly adjust to changing financial circumstances or new forms of fraud.	Retraining the model may be necessary to adjust it to new occurrences, which might be computationally costly.
Anomaly Detection	Excellent in spotting irregularities, which is crucial for risk assessment and fraud detection.	May result in anomaly detection false positives or negatives because of the intricacy of the model.
Real-Time Analysis	Real-time analysis and decision-making capabilities.	High computing resources are needed for real-time analysis, which raises operating costs.
Operational Costs	Can automate a number of financial operations, perhaps lowering operating costs.	The computing demands, initial setup and continuing maintenance can be costly.
Ethical Concerns	Can be developed with fairness constraints to reduce biased decision-making.	The "black box" element might lead to moral dilemmas, especially when making crucial financial decisions.

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- **Efficiency and Automation:** GAI can automate the creation of content. Additionally, it may be utilized to complete laborious and time-consuming activities that were formerly done by hand[21]. By giving users patterns for how material should be presented, it can enable professionals to concentrate more on strategic decision-making and creativity. This also significantly lowers costs and time spent, as well as human error.
- **Creativity and originality:** GAI can produce fresh, unique, varied, and creative material[22]. There are several possible output formats. It may include textual data, images generated by AI, and so forth.
- **Generation of content based on personalization:** GAI may improve user experience by producing

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content according to user preferences and specifications.

- **More consistent and accurate:** The model produces precise and reliable results in real time as long as it is trained on suitable, genuine input.
- **Adaptability:** In contrast to humans, GAI models may be trained on large data sets from a variety of domains, and based on the constraints established by users who oversee the production process, they can be modified to generate data that includes information from different sectors and regions.

In finance, GAI improves financial operations by offering solutions to problems like the complexity of financial data: A financial institution may greatly benefit from straightforward narratives that are clear, succinct, and able to more successfully match the required complicated financial facts [23]. This would need a significant amount of time for financial specialists and analysts to examine the more complicated data, which is prone to human error.

III. Understanding Generative AI In Financial Advisory

Generative AI is a particular type of AI technology that converts processed information into new content that has meaning[24]. Generative AI in financial advisory services offers features that are beyond the conventional chatbot functionality, and offer more than just a simple response to a customer query[25]. The system processes large data to generate personalized recommendations and, in addition, develop a personalized financial plan. Generative AI is not in the same category of AI systems that learn from data to generate insights different from those presented in the input. Such an approach provides deeper and multifaceted results.

A customer visits their financial advisor and asks them to help them allocate an investment fund to different assets. The system, with the aid of the technology of generative AI, would suggest the investments of stocks or bonds, simulate the market conditions and draw up the forecasts according to the current market state [26]. This system would develop a customized investment strategy based on the client's risk tolerance and financial objectives.

A. Real-World Applications of Generative AI in Financial Advisory

Generative AI has since become a buzzword as it has already brought much influence to the financial advisory services. [27]. The technology is used to change the tradition of financial advisory services by utilizing automated task execution and data-driven personalized solutions that improve the work of advisors and customer financial advice. Some of Generative AI technology has several real-world uses in financial advice services, including as:

1) Personalized Financial Planning and Portfolio Management

Generative AI allows generating custom-made financial plans based on the analysis of client goals, financial background, and risk tolerance. It takes large market data to come up with dynamic investment portfolios which change dynamically based on the current market[28]. The simulated investment conditions enable the clients to see the possible results under different conditions.

Example: Wealth front is a company that uses generative AI to provide goal-oriented and personalized investment plans and automated portfolio rebalancing.

2) Automated Risk Assessment and Forecasting

To improve risk management, GAI uses real-time analysis of the market data, which allows it to make precise predictions and detect the emergence of risks early[29]. It analyses assets patterns of stocks, bonds, commodities, and cryptocurrencies to come up with proactive mitigation plans.

Example: BlackRock uses GAI to forecast market volatility and give customers prompt, data-driven investing advice.

3) Real-Time Market Analysis and Investment Insights

GAI has been continuously overseeing financial markets and integrates past data with current market signals, including news, sentiment, and geopolitical events[30]. It provides real-time information to support quick, informed investment decisions.

Example: Kensho (a subsidiary of S&P Global) applies generative AI to millions of data points to predict the effects of market events and enable financial advisors to optimize client portfolios quickly.

Fig. 2. Key benefits of AI integration in business operations

The generative AI has transformative advantages to financial advisory services in several respects to the financial advisors and their clients, as illustrated in Figure 2:

- **Increased Efficiency:** The AI automation of routine tasks like data analysis and report preparation would allow financial advisors to spend their time on key strategic selections and relationships with clients.
- **Improved Accuracy:** The AI leverages a huge amount of data to come up with accurate personalized financial advice that is informed by data[31].
- **Enhanced Client Experience:** Clients are also engaged in the advisory process as they obtain real-time recommendations that are as to their financial requirements.
- **Scalability & Cost Savings:** Generative AI is advantageous to financial organizations as it enables them to increase the number of their clients and reduce operation costs, and provide high-quality services.

IV. Applications Of Generative AI (GAI) In Finance

This section synthesises the main uses of the GAI in the financial industry [32]. All the subsections below have

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maintained the original thematic structure and enhanced clarity, precision, and academic register.

- **Conversational Finance:** NLP-based chatbots are used to improve the customer interaction process by offering real-time, contextual, and financial advice and assistance developed by GAI[33]. These systems enhance efficiency, interaction of users and personalization of the services.
- **Stock Behaviour Prediction:** Financial time series and stock trend prediction can be accurately forecasted with DL and NLP. Recurrent neural networks (RNNs) are used to predict nonlinear trends in data[34], enhancing the accuracy of decision-making and trading. The fate prediction of Stock behavior in Figure 3:

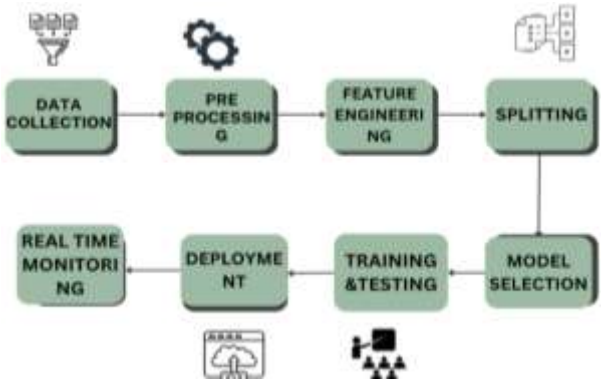

Fig. 3. Stock behavior prediction

- **Fraud Detection:** GAI produces synthetic fraudulent instances to train models, with better detection effectiveness and adaptability. It increases the detection of anomalies and minimizes financial losses, and ensures data security.
- **Synthetic Data Generation:** To address privacy and regulatory limitations, GAI generates realistic privacy-preserving financial data [35]. Synthetic data enhances model training, testing, and collaboration without exposing sensitive data.
- **Analysis of Financial Documents:** Data extraction and summarizing from reports, statements, and earnings calls are automated by GAI [36]. NLP models provide valuable financial insights that support audits, risk assessment, and portfolio management.
- **Financial Query Resolution:** The domain-driven models, such as BloombergGPT, are provide to answer hard financial queries and contextual information, which enhances the accuracy of accounting, compliance and investment services[37].
- **Report Generation:** The GAI models are transformer-based and automatically generate superior financial reports, such as income statements and balance sheets that are easier to see, more accurate, and consistent.
- **Applicant-Friendly Denial Explanations:** GAI produces user-friendly, clear explanations of loan denials, which enhances trust, compliance, and customer experience by, the use of linguistically clear communications.
- **Portfolio Optimization:** A GAI is a simulation tool that replicates market conditions and produces synthetic asset information to optimize investment portfolios, balancing risk and return, and assisting in personalized wealth management.
- **Risk Assessment:** GAI enhances credit risk modelling through the analysis of textual and behavioral data. NLP and NER tools are used to extract important information in loan documents, and identify application inconsistency.
- **Named Entity Recognition (NER):** Transformer models based on GAI distinguish and classify financial entities, including institutions, instruments, and individuals, to improve the information retrieval, analysis, and compliance with regulations

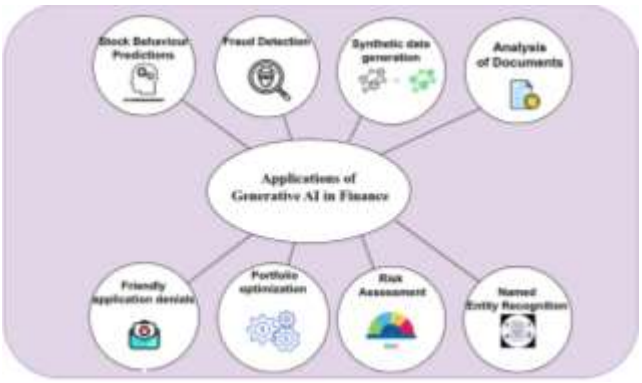

Fig. 4. Applications of Generative AI In Finance

Figure 4 illustrates that Generative AI can be applied in finance, demonstrating how it can be used in changing financial activities. The most important are the prediction of stock behavior, fraud identification, risk assessment, and portfolio optimization that increase decision-making and security. Furthermore, Generative AI facilitates synthetic data creation, document analysis, named entity recognition and managing application denials, so as to create better data efficiency, automation and accuracy in financial systems[38]. Table 2 below addresses the current Generative AI trends and developments of financial advisory services.

TABLE II. GENERATIVE AI IN FINANCIAL ADVISORY SERVICES CURRENT DEVELOPMENTS AND TRENDS

Application Area / Trend / Developments	Description / Function	Benefits / Key Outcomes	Real-Life Example / Industry Impact
Personalised Financial Planning & Portfolio Management	GAI evaluates the goals of clients, financial situation, and risk tolerance to develop individual investment programmes. It dynamically modifies its recommendations based on market changes, and as well as simulates the future performance of the portfolio.	Tailored investment strategies Adaptive, data-driven portfolios Improved client engagement and decision-making	Wealthfront – Uses GAI to create goal-based investment solutions and automatically rebalance portfolios according to changing market conditions.
Automated Risk Assessment & Forecasting	GAI evaluates real-time data across assets (equities, bonds, commodities, crypto) to identify risks and forecast trends using predictive analytics.	Early risk detection Accurate market forecasting Enhanced advisory precision	BlackRock – Employs GAI-driven models to assess market risks and forecast volatility, offering clients timely investment adjustments.

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Real-Time Market Analysis & Investment Insights	GAI integrates live financial data with historical records, sentiment analysis, and geopolitical factors to provide predictive and real-time market intelligence.	Continuous insight generation Faster decision-making Improved responsiveness to market shifts	Kensho (S&P Global) – Delivers real-time market analytics using GAI to predict the impact of global events on asset performance.
AI-Driven Personalisation (Trend)	GAI technologies personalise financial services by analysing behavioural, transactional, and risk data to craft individualised financial advice.	Hyper-personalised recommendations Increased customer satisfaction and retention	Seen across WealthTech platforms offering bespoke investment journeys.
Predictive Risk Intelligence (Trend)	Utilising generative models to predict financial instability or portfolio risks by detecting complex market correlations.	Enhanced proactive risk management Minimised exposure to volatility	Implemented by major asset managers for early warning and stress-testing.
Conversational Advisory Tools (Trend)	Integration of GAI chatbots and virtual assistants capable of natural, context-aware financial dialogue.	Reduced service workload Enhanced customer support and engagement	Adopted by banks and fintechs to provide 24/7 advisory interactions.
Real-Time Data Integration (Trend)	Continuous ingestion of market data, news sentiment, and social signals to enable dynamic investment recommendations.	Immediate reaction to global market events More agile advisory decision-making	Supported by data-driven platforms like Bloomberg and Refinitiv using AI-powered analytics.

The personalization, data-based, and adaptive technologies in financial advisory services make a difference with the help of generative AI (GAI). It is critical to the customized portfolio management, automated risk evaluation, and real-time market analysis[39]. Table II shows that, BlackRock, and Kensho are among the platforms that use GAI to provide customized investment plans, forecast risks, and generate real-time insights. New trends, such as AI-based personalization, predictive risk intelligence, and conversational advisory applications, further improve client engagement and decision-making efficiency. Altogether, GAI is restructuring the financial advisor practice through advocating smart, reactive, and client-centred service provision.

V. Limitations And Future Direction

The GAI has shown a promising future in the financial industry, a number of constraints, including in Figure 5, risks, and ethical issues, do not allow it to be widely used[40]. Although GAI has a great potential in automation and decision-support, it is limited in its current state, which needs to be resolved with the help of better transparency, strength, and adaptation to domains.

A. Lack of Real-World Complexity

The GAI models have constraints in the data that they are trained on, and are not able to represent complex, interdependent variables that impact real-life financial markets[41]. Their artificial outputs tend to be sensitive to macroeconomic, geopolitical, and behavioural market changes, making them less realistic and less predictive of actual financial situations.

B. Market Risks

The GAI-based models of finance are susceptible to black swans, which are disruptive events in the market that are not observed in the historical data[42]. Because these models are based on historical trends, they are likely to distort future volatility, leading to faulty forecasts and potential losses if the case is not monitored by humans.

C. Interpretability and Explainability

GAI models, notably DNN, are “black boxes” and it is hard to know how they make their decisions[43]. It is this opaqueness that constrains their application to risk-sensitive areas where transparency and compliance with regulatory requirements are necessary to enhance accountability and auditability.

D. Limited Long-Term Predictive Ability

For short-term forecasting, GAI models do not work well in the long term because of changing market conditions, policy shifts, and global events that cannot be predicted. They cannot adapt well to future changes because they depend on historical data.

E. Overfitting

Without proper validation, GAI models can risk overfitting and perform well on known data but poorly on unknown data. To ensure model generalization and avoid bias towards historical patterns, regularisation methods and rigorous cross-validation are necessary.

F. Resource Intensity

The large GAI models are computationally resource-intensive and require huge memory and energy to train and deploy. Their size to address real-time financial data requirements sophisticated infrastructure, which makes the operation expensive and not very accessible for small-scale institutions [44].

G. Maintenance Costs

GAI models need to be retrained and fine-tuned continuously in order to be kept up-to-date and compliant. Making changes so that the models are in tandem with the fluctuations in the market and regulatory changes comes at a high financial and technical cost, which affects the long-term sustainability.

H. Bias and Fairness

GAI models can replicate or increase the biases present in historical financial data, which lead to discriminating or skewed results. One of the most important research problems is to address data bias using various training sets, audits of bias, and algorithms that are conscious of fairness.

I. Domain Understanding

Despite being capable of producing realistic financial text, GAI models do not necessarily possess the subtlety of

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financial terminology and domain-related semantics. Specialised financial corpora models, like BloombergGPT, are steps to this limitation.

J. Privacy Concerns

Financial applications are a huge threat to data privacy. Cases of sensitive data being exposed through such platforms as ChatGPT have led to questions about adherence to the rules, like GDPR. Many reputational and legal consequences of AI system misuse could have serious repercussions for financial institutions.

K. AI-Powered Avatars

The rise of self-learning virtual assistants and avatars augments customer experience but poses ethical and operational challenges. While capable of empathy and personalised communication, their deployment raises questions about data security, transparency, and overreliance on automation.

L. Personalised Financial Product Generation

GAI can personalise financial solutions based on user profiles and behavioural data, including loans, investments, and insurance. However, excessive personalisation without proper regulation may lead to privacy breaches, unfair pricing, or manipulation of consumer behaviour.

Fig. 5. Limitations and future Directions

VI. Opportunities 0f Gen-Ai In Finance

In this section, outline the potential that comes with using Gen-AI approaches in the financial domain. Generally speaking, divide the opportunities into four main categories: interactive, educational, advisory, and assistive.

A. Interactive Applications

Gen-AI technology has the potential to become the industry standard for both Task-Oriented Dialog and Open-Domain Dialog, making it the preferred approach for creating interactive, conversational applications. These methods are more logical and consistent because of their inherent ability to track references to prior entities, ask follow-up questions, and account for user preferences. Compared to rule-based chatbots, which may provide pre-configured answers to a predetermined set of questions, they are a huge advance. Retrieval Augmented Generation (RAG) and fine-tuning can assist Gen-AI approaches to become more domain-specific and/or access more current relevant information to serve consumers with ordinary to complicated questions while generating more engaging and personalized experiences. According to McKinsey, depending on a company's current automation level, Gen-AI might further cut the number of human-serviced engagements by as much as 50%. Additionally, Klarna, a Buy Now Pay Later (BNPL) startup, has shown that integrating Gen-AI approaches into its customer support tool can have a $40 million effect. Additionally, attractive backdrops for gift cards, debit cards, credit cards, and coupons might be made using Gen-AI techniques. Numerous models, such as Parti, allow content-rich synthesis including intricate compositions and world knowledge and may produce high-fidelity photo-realistic visuals. Additionally, dynamic, aesthetically beautiful themes for more engaging, context-specific apps may be produced using Gen-AI approaches.

B. Assistive Applications

Digital automation, co-piloting, auto-filling, and purchasing are all ways that Gen-AI approaches may help. Specifically, by employing Gen-AI approaches, agents can be trained to execute APIs, enabling them to perform tasks and automate routines, significantly improving the quality of life for individuals who struggle with movement and dexterity. Additionally, a payments co-pilot can assist in finding ways to improve card and instrument mode payment alternatives (such as bank accounts and cards)[45]. Because forms on the internet are dynamic and ever-changing, autofilling is a complex issue that can be addressed with Gen-AI algorithms that can scan and comprehend page content. Additionally, Gen-AI agents can serve as digital assistants[46]. A digital assistant called LLaSA may analyze the product inventory and make suggestions that closely align with the user's requirements.

C. Educative Applications

Applications using Gen-AI approaches can empower, educate, and advise people. financial awareness. Incidentally, by thoroughly analyzing a customer's or business's current financial information, Gen-AI technology could pinpoint financial patterns that could lead to investment opportunities or cost-reduction measures[47]. In particular, Gen-AI solutions can be used to gauge the mood of the market, news, and other information to recommend and create more effective trading plans by consuming large amounts of financial data[48]. Moreover, chatbots designed with Gen-AI can understand complex topics such as mortgage planning and investment strategies (including stock options and mutual funds).

D. Advisory Applications

The capabilities of Gen-AI approaches can be used by financial institutions to develop effective financial advice application tools (risk assessment, proactive detection, summarization, and recommendations). Gen-AI could be used in developing complex ML models by examining massive amounts of financial data to identify unusual patterns of fraud. They can be applied to predict financial risk, detect financial fraud in payment systems, enhance credit ratings, and evaluate credit risk, with the help of a chain of thought prompts to induce more thought and precision[49]. Additionally, Gen-AI methods have been shown to be remarkably effective in identifying important themes and summarizing documents in a succinct yet useful manner.

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VII. Literature Review

The section provides a detailed overview of previous research on GAI integration and its implications for the financial services industry.

Joshi (2025) study is also concerned with essential ethical issues in transparency, privacy of data, and regulation in AI-based finance. They conclude that although AI is pushing some traditional roles out of the industry, the main impact is on human proficiency as a force multiplier, enhancing rather than eliminating it. The AI collaboration methods enable financial professionals to gain an edge in a competitive environment where the human-AI collaborative approach is emerging as the new value creation paradigm. The data are cited in the literature, and it is only a review piece[50].

Tahvildari (2025) proposes a method that combines human control, XAI, sophisticated financial analytics, and ethical AI governance to integrate generative AI into robo-advisory systems. Future studies should focus on empirical evaluations of hybrid advising models, regulatory harmonization, and AI-based financial education platforms to promote more responsible adoption. The findings can contribute to the conversation on using AI in financial services in a sustainable and user-focused manner and provide policymakers and industry practitioners with strategic guidance[51].

Kuo et al. (2024) provides the latest trends and advances of GAI and finance intersection. They performed a systematic classification and analysis of the current research to reveal the dominant themes and new directions of interest by applying an advanced topic modeling algorithm, BERTopic. They highlight the unique use of GANs in the creation of artificial financial data, the revolutionary nature of large language models (LLMs) in finance, and the urgent need to develop a new regulatory framework to oversee GAI use in the financial industry. The purpose of this paper to give the researchers and practitioners an organized overview of the present-day situation in the field of GAI in finance and offer perspectives on the advantages and disadvantages of the proposed cutting-edge technology[32].

Desai and Ravi (2024) provide a Gen-AI techniques are implemented in the area of finance. Specifically, present the opportunities and challenges related to the application of the Gen-AI techniques in finance, also demonstrate the different methodologies one can employ to train Gen-AI and provide the different application areas of Gen-AI techniques in finance ecosystem. To knowledge, it is the most generalized summary of Gen-AI techniques in the financial domain[52].

Han et al. (2023) consider the possible impact of AI adoption in financial services. AI is currently used extensively across financial services, including risk assessment, fraud detection, investment management, and customer support. For instance, by leveraging predictive analytics and pattern recognition, AI may help financial organizations make more precise investment decisions. AI can analyze vast volumes of data to identify trends that indicate credit risk or loan defaults. Additionally, AI chatbots and virtual assistants are transforming customer service by offering round-the-clock assistance and enhancing the client experience[53].

Hamadi and Ghazzai (2022) propose identifying effective ways to connect investors with financial advisers to address the portfolio optimization challenge. A Generative Adversarial Network (GAN) is used to recruit financial advisors by framing the problem as an image-processing task in which the attributes of financial advisers are captured in grayscale photographs. As a result, the GAN is taught to provide the "ideal" financial adviser profile based on an input investor profile. The next step is to do a low-complexity, many-to-many investor-to-financial-adviser matching by calculating the degree of similarity between the ideal profiles that were produced and the profiles that are already in the crowdsourced database[54].

Table 3 provides a comparative summary of recent studies on Generative AI in financial services, outlining their objectives, methodologies, key findings, and identified research gaps to highlight the current state and future directions of scholarly discourse in this field.

TABLE III. Comparative Summary of Key Studies on Generative AI in Financial Services

Author(s) & Year	Study Focus / Objective	Methodology / Approach	Key Findings / Contributions	Ethical, Regulatory, or Practical Implications	Future Directions / Research Gaps
Joshi (2025)	Examines ethical and professional implications of AI-driven finance.	Literature-based review of AI adoption trends in financial institutions.	Highlights issues of algorithmic transparency, data privacy, and compliance. Finds AI augments rather than replaces human expertise.	Emphasises responsible AI governance and the evolving human-AI partnership in finance.	Calls for empirical studies on human-AI collaboration and skill adaptation in financial sectors.
Tahvildari (2025)	Proposes framework for integrating GAI into robo-advisory systems.	Conceptual concept integrating XAI, human supervision, and financial analytics.	Introduces hybrid AI–human advisory approach ensuring ethical and explainable decisions.	Advocates regulatory harmonisation and ethical AI governance in fintech.	proposes an empirical assessment of AI-powered financial education resources and hybrid advice models.
Kuo et al. (2024)	Maps recent developments and themes in GAI research within finance.	Topic modelling using BERTopic on large corpus of financial AI publications.	Identifies major themes: finance-specific LLMs, GAN-based synthetic data, and regulatory challenges.	Stresses need for new regulatory frameworks governing GAI use.	Recommends deeper exploration of domain-specific models and compliance frameworks.
Desai & Ravi (2024)	Provides comprehensive overview of Gen-AI applications in finance.	Systematic review of Gen-AI methodologies and financial use-cases.	Details opportunities, challenges, and training techniques for GAI deployment.	Highlights technical and operational limitations in financial AI systems.	Encourages more comparative and cross-domain studies of GAI techniques in financial ecosystems.

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Han et al. (2023)	Explores AI's impact on financial services operations.	Analytical review supported by real-world AI implementations.	Records the use of AI in customer service, risk assessment, fraud detection, and investment management.	Notes improvements in decision accuracy and customer experience but flags ethical concerns.	Calls for balance between automation and human oversight in financial decision-making.
Hamadi & Ghazzai (2022)	Addresses portfolio optimisation and advisor matching using GAI.	Uses GAN to generate ideal advisor profiles based on investor data (image-based representation).	Demonstrates low-complexity investor–advisor matching via generative modelling.	Highlights innovative use of GANs in personalised advisory matching.	Suggests extending the GAN-based model to other advisory and investment domains.

VIII. Conclusion And Future Work

Generative Artificial Intelligence (GAI) has emerged as a transformative technology in the financial sector, driving automation, personalisation, and intelligent decision-making. GAI can enable financial organisations to optimise their portfolios, enhance the quality of the risk assessment, prevent fraud and offer advisory services based on data by using the state-of-the-art models, such as GANs, VAEs, and large language models. Its adoption is rapidly spreading across all financial sectors, driven by its ability to deliver real-time, predictive, and customer-oriented solutions. However, despite these developments, a great struggle has been experienced. Algorithms, explainability, algorithm transparency and data privacy are all limitations to responsible implementation. Moreover, the cost of GAI models to compute and maintain is high and this limits the opportunities of smaller financial organizations. To improve the trustworthiness and compliance of the models, future research should be used to boost model interpretability, model of ethical governance and domain fine tuning in future studies. The second major move will be to develop hybrid human-AI advisory systems to minimize automation and human judgment. Also, there will be an opportunity to expand empirical evaluations of GAI application in diverse financial settings and, thus, contribute to making it more valid and generalizable. As the finance industry transitions to smart automation, a single, ethical AI, regulatory regularity and explainable generative models will establish the foundation of the next phase of sustainable, trustworthy AI-based finance.

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