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The Application of Generative Artificial Intelligence in Virtual Financial Advisor and Capital Market Analysis

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Abstract: This paper explores the application of Generating Artificial Intelligence (GAI) to virtual financial advisory and capital market analysis. This paper first introduces the basic principle of GAI and its importance in financial decision-making, and then analyzes the problems and limitations of traditional financial advisory model through literature review and actual data. Then, it discusses the development trend and advantages of intelligent financial advisor, and the difference compared with traditional financial advisor model. Then, it describes the application of generative AI in the financial field, including intelligent investment advisory, risk assessment, investment decision-making and so on. Finally, the realization path of building intelligent financial decision based on generative AI is proposed, including data collection and collation, building large model of enterprise real data, building interactive data analysis and decision system based on natural language, personalized financial analysis and decision support, etc. Through these measures, we can better achieve intelligent, personalized and efficient financial decision support, and provide more intelligent and efficient support for financial decision making.

Keywords: Generative Artificial Intelligence, Financial Decisions, Artificial Intelligence, Financial Market.

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1 Introduction

Driven by digital technology, Artificial Intelligence has ushered in rapid development, among which Generating Artificial Intelligence (GAI) attracts attention with its unique capabilities. By learning large amounts of data and patterns, generative AI can automatically generate creative content and simulate human behavior and thinking. In the field of financial decision making, the application of generative AI is of great value to improve the accuracy and efficiency of decision making. This article will explore the application of generative AI to virtual financial advisors and capital market analysis. Generative AI covers risk assessment, investment decision-making, financial analysis and other aspects, while processing massive data, discover hidden rules and trends, and provide accurate predictions and recommendations. In addition, generative AI can assist financial analysis, helping analysts and investors to better understand and interpret financial data and provide more comprehensive information. Through a literature review and analysis of real-world data, this paper reveals the potential value of generative AI in virtual financial advisors and capital market analysis to provide more intelligent and efficient support for financial decisions.

2 Related Work

2.1 Traditional financial management

As a financial intermediary, the traditional financial advisor plays an important role in the financial system. According to a survey, nearly 70 percent of wealthy families say they meet with a financial advisor every year and seek advice on investment and financial planning. They help individuals and institutions manage and grow their financial assets by providing advisory services, financial product recommendations, asset allocation advice, and more. [1] According to the Financial Planning Association, more than 75% of American households seek professional financial advice when making financial decisions. The traditional investment advisory service is based on manual service, which is limited by fixed time and space, bringing long service time and non-real-time data service, and poor customer experience. Intelligent advisory services use big data, intelligent algorithms and electronic information transmission methods to scientifically simplify the service process, and realize the electronic and intelligent process in marketing methods, user evaluation, asset allocation suggestions, intelligent rebalancing, information

communication and customer report generation, etc., and provide customers with 7 * 24 hours investment advisory services through numerous platforms. Effectively improve customer experience.

Although traditional financial advisers play an important role in the financial services market, there are some drawbacks and limitations [2]:

1. Limited Reach: Traditional financial advisers are often limited to face-to-face meetings with clients, which limits the reach of their services. In particular, for clients in remote locations or who are pressed for time, timely financial advice and services may be difficult to obtain.

2. Lack of personalization: The services of traditional financial advisers often rely on manual advice and advice, so it is difficult to achieve a highly personalized service when dealing with a large number of clients. This can result in some clients being unable to receive professional advice tailored to their specific needs.

3. Lack of comprehensive information: Financial advisors' recommendations and recommendations often rely on their own experience and knowledge, but may not cover all financial products and market information. [3]This can result in customers not having access to comprehensive financial information and making less-than-comprehensive decisions.Therefore, while traditional financial advisers play an important role in the financial market, their limitations and drawbacks need to be taken into account, and with the advancement of technology, the demand for more efficient and personalized financial services is also increasing.

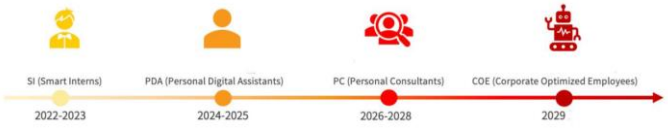

Figure 1. Evolutionary path of financial advisors

The evolution of intelligent assistants in the enterprise has gone through four key stages: Intelligent Intern (SI), Personal Digital Assistant (PDA), Personal Advisor (PC), and enterprise Optimized Employee (COE). In the smart intern phase, AI is mainly responsible for automating processes to improve work efficiency; In the personal digital assistant phase, AI begins to handle more complex personalized needs and provide service optimization based on user behavior patterns. In the third stage, individual consultants are able to provide professional advice through in-depth data analysis to support decision making. Eventually, AI develops to the stage of employees optimized for the enterprise, becoming a key force that can independently perform tasks and participate in innovation, driving innovation and development of the enterprise. These stages demonstrate the evolutionary path of AI in business operations, from simple automation tools to intelligent systems capable of providing complex analysis and decision support, providing critical support for business growth and transformation.

2.2 Intelligent finance

Intelligent financial advisor refers to the use of new technologies such as artificial intelligence, combined with core technologies such as big data and cloud computing, and highly integrated with the financial field to provide technical support for various enterprises and participants in the financial industry, highlighting the important role of artificial intelligence technology in the financial industry participation process. According to a report by International Data Corporation (IDC)[4], the smart financial services market is expected to reach $1.2 trillion by 2025, with a compound annual growth rate of up to 23%. Its participants include companies that provide AI technology services to financial institutions, traditional financial institutions, emerging financial formats, and indispensable regulators in the financial industry, which together constitute the smart financial ecosystem.

The service mode of intelligent financial advisor is mainly divided into two types:

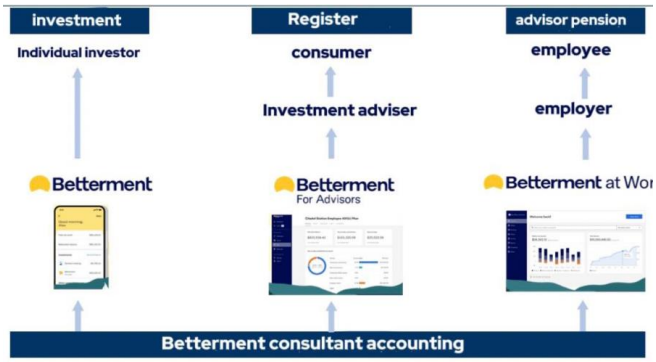

Figure 2.Betterment enterprise unsupervised consultant working model

The completely unattended mode and the partially unattended mode. In a completely hands-off model, smart investment platforms such as Betterment（Figure 2) and Wealthfront use advanced algorithms to automatically manage portfolios without human intervention. These platforms automatically conduct asset allocation, buying and selling transactions by analyzing data such as users' investment objectives, risk tolerance and market conditions to achieve portfolio optimization. For example, if a user's investment goal is long-term appreciation and has a high risk tolerance, an intelligent investment platform may allocate more funds to high-risk and high-return investments, such as the stock market.

In the mode of partial unmanned intervention, intelligent investment platforms such as Vanguard Personal Advisor Services provide partial manual services. Investors can talk to a registered investment advisor and get more personalized investment advice. [6-8]These platforms usually communicate with investors through online chat,

phone calls or video conferencing to understand their specific needs and situations, and then provide more personalized and professional investment advice according to the requirements and preferences of investors, combined with the platform's intelligent algorithms. For example, if an investor has a specific investment goal or has a particular focus on a certain industry, a registered investment adviser can tailor his portfolio to better suit his needs.

In summary, whether it is a completely unmanned mode or a partially unmanned mode, the core of intelligent financial advisers is to use advanced algorithms and technologies to provide intelligent investment advice and services for investors. The advantages of this model are its efficiency, convenience and personalization, which can help investors better achieve their financial goals and manage their assets.

Although smart financial advisors have many advantages, such as lowering the service threshold, expanding the audience, improving the quality of service, etc., there are also some problems. In addition to potentially lacking the flexibility and creativity of human subjective judgment, smart financial advisers also face challenges in terms of data security and privacy protection. [9]For example, some smart financial advisors require large amounts of personal financial data for analysis and recommendations, which can raise privacy concerns for users. In addition, information asymmetry in the selection of underlying assets may affect investors' decisions, and the algorithms of intelligent financial advisers may be affected by market fluctuations and unexpected events to produce misjudgments. Therefore, while developing smart financial advisers, it is necessary to strengthen the supervision of data security and privacy protection, and improve the stability and accuracy of algorithms to ensure the interests and trust of investors.

2.3 Generative artificial intelligence and financial management

Generative AI is a technique based on deep learning models that is able to generate new data similar to the training data by learning the intrinsic distribution of large amounts of data. The working principle of generative AI is based on generative adversarial networks [10](Gans) and variational autoencoders [11](VAE).

GAN consists of two components: generator and discriminator. Generator is responsible for generating new data samples, and discriminator is responsible for distinguishing generated samples from real samples. By iteratively optimizing both networks, the generator gradually learns the distribution of the training data to generate more realistic samples. VAE learns the potential representation of the input data through probabilistic encoding and decoding, which is remapped to a generated sample by the decoder.

In the field of financial decision-making, generative AI learns data distribution through deep learning models, learns historical financial data and market trends, and generates new data samples for decision support such as financial forecasting, investment advice, and risk assessment. Compared to traditional rules-based decision systems, generative AI provides more accurate and flexible decision outcomes, understands complex financial markets and economic environments, and adjusts and optimizes in real time as data changes. It works based on Gans and VAE[12-14], generating high-quality samples through adversarial learning and probabilistic coding and decoding. Through continuous optimization and adjustment, generative AI is able to understand and adapt to complex environments and changing data to provide accurate and flexible decision support.

In general, generative AI has several advantages in financial decision making.

1. Data-driven decision support[14]. Generative AI is able to process large amounts of complex data and uncover hidden patterns and patterns to provide more accurate and comprehensive financial forecasting and analysis. This helps businesses and individuals develop scientific and effective financial strategies that reduce risk and increase returns.

2. Personalized financial advice. Generative AI can provide investment advice and financial planning tailored to each individual based on their financial situation, risk tolerance, and goal preferences. This personalized service can better meet the needs of different groups of people, improve the effect of decision-making and satisfaction.

3. Automated and intelligent prediction and decision-making process. Generative AI can automatically process and analyze large amounts of data, reducing tedious manual work and saving time and human resources. By using historical data and trends for intelligent forecasting, generative AI can give more accurate financial trends and risk warnings to help decision-makers make smarter decisions. [15]At the same time, it can analyze and mine a large amount of financial data to find potential patterns and correlations, and provide decision-makers with a more comprehensive and in-depth perspective. Ability to build complex risk models, identify and quantify potential risk factors, and provide appropriate countermeasures; The ability to process and analyze data in real time provides decision-makers with immediate decision support, enabling them to quickly adjust strategies and decisions in response to market changes.

3 Financial decision realization path of generative AI

3.1 Architectural model

In order to achieve a more humane, efficient and accurate interactive financial decision-making scenario, this paper constructs a path framework for intelligent financial decision-making based on generative AI, as shown in Figure

1. The framework covers the following key steps.

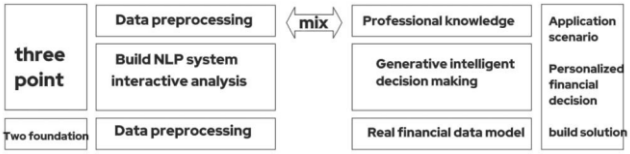

Figure 3. Generative AI financial decision architecture

3.2 Data collection and arrangement

In order to optimize and improve the financial decision-making of enterprises, data collection and collation is crucial. In addition to traditional financial statements and data, more comprehensive structured and unstructured data can be obtained through a variety of data sources, such as open [16]API interfaces. The key to data collection and collation lies in the ability of data governance. Strengthening the infrastructure of data governance can obtain more accurate, comprehensive and reliable financial data by optimizing the process of data collection and collation. This will provide a reliable basis for subsequent data analysis and decision making, and provide accurate and useful information for intelligent decision advisors.

3.3 Build a large model based on the real data of the enterprise

The key to optimizing corporate financial decisions is to build large models based on real data and use them to train generative AI models to learn the laws and knowledge of the financial field. The steps include collecting and preparing financial data, designing suitable large model architectures, training and optimizing models, verifying and evaluating performance, and continuously updating and improving. Through this model, it can provide more accurate financial analysis and forecast, and provide accurate and reliable support for enterprise decision-making.

3.4 Construct interactive data analysis and decision system based on natural language

By harnessing the power of generative AI large models, it is possible to optimize and refine the financial decision-making process of enterprises and develop a data analysis and decision system that supports natural language interaction. The system is able to understand the questions or needs raised by users and extract key information from complex financial data to provide accurate answers and recommendations [17-20]. The system can automatically query, analyze and visually display financial data according to the questions raised by users to help users quickly obtain the required information. At the same time, the system can give accurate decision-making suggestions according to data trends and rules, and help enterprises to make wise financial decisions. Through this interactive system, users do not need to have professional financial knowledge, can easily carry out data analysis and decision-making, obtain valuable information in a short time, improve the efficiency of decision-making.

3.5 Integration of general and specialized knowledge

Generative AI grand models can be optimized to blend general financial knowledge with expertise in specific industry areas. In this way, large AI models can gain more comprehensive and in-depth understanding capabilities. Such a large industry model can handle conventional financial analysis and decision making problems, and can provide customized solutions to the specific needs of different industries. By combining general knowledge and specialized knowledge, the applicability and accuracy of AI large models in the financial field can be improved, providing users with more accurate and valuable advice and decision support. [21]This hybrid fusion of knowledge will drive the development of AI in the field of finance, helping businesses and individuals to better deal with complex financial issues.

3.6 Integrating Other Mainstream Technologies

Combine generative AI with other mainstream technologies such as machine learning, deep learning, RPA, next-generation ERP, online audit and remote audit, online office, accounting big data analysis and processing technology, business intelligence [22] (BI), etc., to further optimize and improve the intelligent financial decision-making system. For example, machine learning algorithms can be used to analyze and forecast a large number of financial data to provide more accurate financial indicators and trend predictions. Use RPA technology to automate the generation and interpretation of financial statements to improve efficiency and accuracy.

3.7 Personalized financial analysis and decision support

By learning users' preferences and habits, personalized financial analysis and decision support can be achieved. A generative AI grand model can analyze a user's financial data and investment history to understand their risk appetite, investment goals, and time frame.

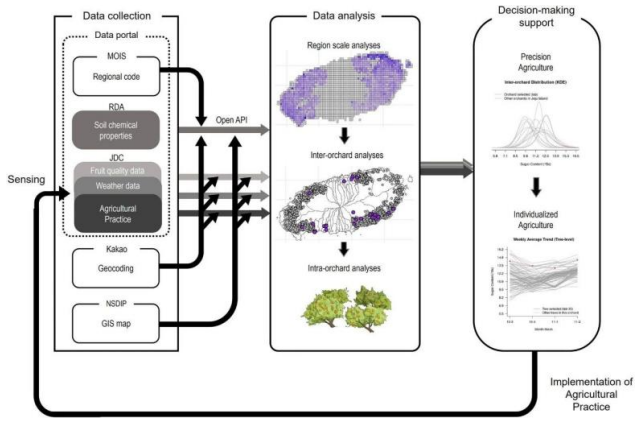

Figure 4. Individualized financial decision analysis model

Based on this information（Figure 4), the model can provide personalized financial analysis reports to provide users with targeted investment recommendations and decision support. In addition, the model can also track the user's investment portfolio on a regular basis, making intelligent adjustments according to market changes and user needs, ensuring continuous optimization and adaptability of investment strategies. With personalized financial analysis and decision support, users can better understand their financial situation, optimize investment decisions, reduce risk, and achieve financial goals.

3.8 Providing Customized Solutions

To meet the specific needs of different industries, customized financial analysis and decision support solutions can be provided. By understanding industry-specific financial metrics, key business data, and market trends, generative AI grand models can provide professional advice and insight within the industry. Based on this domain-specific knowledge, the model can provide users with tailored financial analysis reports to provide relevant decision support for industry characteristics and challenges. Whether in retail, manufacturing, finance, or technology, generative [23]AI large models can provide industry-specific data analysis, competitor analysis, and market predictions based on users' needs and goals. With customized solutions, businesses and individuals can better understand the financial situation of the industry, track trends, develop strategies, and make more informed financial decisions.

The advantages and application prospects of generative AI in financial decision making are still exciting. In the future, the feasibility and value of the application of generative AI in financial decision-making should be further studied comprehensively and deeply. Interdisciplinary research will be an important way to promote the development of innovation in financial decision making, and by combining expertise in the field of finance with generative AI technology, challenges in financial decision making can be better addressed[24-25]. At the same time, it is necessary to pay attention to the challenges and limitations that generative AI may face in financial decision-making, which involves various aspects such as data privacy issues, the interpretation of models, and the fairness of algorithms, in order to ensure the healthy development of generative AI in financial decision-making.

4 Conclusion

The application of generative AI in financial decision making provides a more user-friendly, efficient, and accurate interactive approach to business decision making and data analysis. Combined with intelligent technologies such as speech recognition and face recognition, generative AI can improve the intelligence level and user experience of automated processes. At the same time, it can integrate rich data sources, such as social network data, Internet of Things data, etc., to achieve more accurate business decisions and data analysis. In addition, generative AI brings more efficient and intelligent business process solutions to financial decision-making through robotic process automation (RPA)[26] technology that combines automated processes and tasks. For example, tasks such as automated report analysis and automated financial decision-making are gradually being implemented. These automated processes can greatly improve work efficiency and reduce error rates.

Generative AI is entering a new era of rapid development on a global scale, although it has spawned countless application scenarios in all walks of life, but there are still many challenges to achieve real landing applications, governments and enterprises have called for strengthening the control and governance of generative AI to ensure that the technology complies with relevant laws and regulations such as data security. In this context, through the accumulation of various fields such as strategy, enterprise transformation, risk management, and integrating its own technical experience and cutting-edge capabilities, it has recently launched an innovative artificial intelligence platform. With the resources of generative Intelligence, we are committed to helping customers comply with policies and compliance requirements while using AI to optimize workflows. Technical applications include professional services that assess AI application scenarios, discover industry best practices, and develop effective implementation roadmaps to prepare enterprises to harness AI's potential more effectively. At the same time, we focus on quantifying the business value of AI applications, prioritizing those projects with the greatest revenue potential.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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