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Digital Twin Modeling of Financial Advisors using AI for Hyperpersonalized Wealth Management

Journal of Electrical Systems

Abstract: - The idea of a digital twin-capable robo-advisor for individual financial planning is the subject of this study. A digital twin-based interactive and interpretative model was constructed using an exploratory study to assess some of the important aspects to think about while building the next generation financial advice robo-advisor. Its primary function is to evaluate the current state of affairs and, after analysing the available data, to provide a framework that may guide further studies. Publications such as books, journals, case studies, and magazines were combed through for relevant information. The purpose of this research is to evaluate digital twins (DTs) as a potential new standard for intelligent financial advisers (robo-advisors) that may aid in the development and implementation of FinTech services and solutions that are uniquely suited to each individual client. DT-enabled robo-advisors may improve financial management and well-being. When DT is turned on, a robo-advisor stops being ad hoc and starts providing users with a full-fledged, ever-changing financial consulting service. The study sheds light on finance robo-advise with DT abilities, which can optimise intelligent investments and bring about transformation.

Keywords: digital twin, robo-advisor, fintech, AI, hyper-personalization

1. INTRODUCTION

Global adoption of financial technology (FinTech) has led to several new financial services that regular people may use on their inexpensive cellphones. The convergence of AI, data utilisation, finance, and practical need for improved financial services is what makes FinTech so successful [1]. When digital technology and financial markets come together, it forms finance technology, which stands for "financial technological advances creative thinking." This innovation in turn affects financial institutions and markets and the products and services offered to customers [2]. This innovation has the potential to shake up the financial industry by facilitating disengagement and transforming the ways in which current companies produce and distribute services and products. It also tackles issues of confidentiality, regulation, and enforcement, opens up new avenues for entrepreneurial activity, and promotes broad development [3].

Financial technology (FinTech) is at the forefront of how financial services are improved via the use of ICT in areas such as the marketplace, purchases, settlements, electronic money, information analysis, and more efficient financial services overall. According to [4] the banking, insurance, and financial sectors have all been affected by or improved by financial technology solutions and companies. In the realms of both finance and technology, they are quickly rising to the top of the growth charts. Furthermore, broad finance has been created and other finance advances have been prompted by FinTech. [5] define financial participation as the practise of making cost-effective monetary services available to virtually all groups of people, including those with lower incomes, through mechanisms like crowdfunding, peer-to-peer lending, and money transfers.

How will FinTech develop in the future, especially with regard to its impact on individual financial management and robo-advisory services? The advancement of AI has been a game-changer in turning large data into valuable assets for companies and people alike. You may co-create new value by extracting, analysing, and presenting data from both formal and informal

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resources to the user in a systematic way. Financial technology may benefit from several areas of artificial intelligence development, including digital twins.

A people's "digital twin" (DT) may be defined as a digital copy of themselves that can combine historical data with up-to-the-minute information to provide users with personalised recommendations, suggestions, and comments as well as different answers to their problems. Better decision-making and managing clients are the end results of DT, which include creating fresh instruments, technologies, and processes for data collection, storage, and analysis. The potential of DT in creating robo-advisors is the focus of this research. In order to compile data for this study, the researchers used the exploratory research approach and theme analysis from previous research. There is significant potential for DT to optimise financial services along with leadership due to its ability to create value co-creation. Each user may then benefit from this co-creation of value in the form of a robo-advisor. This study aims to address a knowledge vacuum in the field and provide insight into the direction of future research on the consequences of DT on personal financial services.

The concept of DT robo-advisor, along with its features and potential applications, are discussed in this article. The remainder of the article is structured as follows: first, we will take a look at digital twins, then we will analyse robo-advisors and the concept of financial technology. The technique is presented in Section 3, while the suggested model is presented in Section 4. The conclusion is presented in Section 5.

2. RELATED WORK

The cost of information and communication technology (ICT) is the second-largest cost component in the financial sector, accounting for 15-20% of the overall cost [6] Spending on information and communication technology (ICT) is the greatest of any industry, at 4.7-9.4% of sales, compared to 3.3% for insurance and 2.6% for airlines. Banks, insurance firms, and other financial intermediaries were among the first to employ information and communication technologies (ICTs) due to the strategic significance of these sectors.

2.1 Robo-Advisors in FinTech

Robo-advisors have gained prominence in the FinTech sector as automated digital platforms offering financial planning services with minimal human intervention. These systems rely on algorithmic models for investment advice, risk assessment, and portfolio management. However, their limited personalization reduces effectiveness for users with complex financial needs. The integration of Artificial Intelligence (AI), particularly through machine learning, natural language processing, and recommender systems, has enhanced robo-advisors by enabling data-driven predictive analytics. Despite these advancements, most AI-based systems remain reactive, lacking proactive simulation of user behavior. The emerging concept of Digital Twin (DT) [7] technology—originating in engineering—offers new potential in finance by creating real-time, virtual replicas of users to simulate financial behavior and enhance decision-making. Although DT applications in finance are still developing, they promise a significant leap in personalization and engagement. Hyperpersonalization, driven by AI and real-time behavioral data, is increasingly viewed as a critical factor in client satisfaction within wealth management. However, current research seldom combines DT and AI for dynamic, adaptive financial planning. Addressing this gap, the present study explores a novel framework for robo-advisors powered by DT and AI to enable hyperpersonalized, real-time wealth management solutions.

2.2 Artificial Intelligence in Wealth Management

Artificial Intelligence (AI) plays a transformative role in enhancing robo-advisory services. Studies by [8] highlight the use of machine learning for predictive analytics in wealth management, offering more tailored investment strategies. Natural Language Processing (NLP) and recommender systems have also been employed to understand customer preferences better. Yet, many AI-enabled advisors are reactive, responding only to user input rather than simulating user behavior dynamically.

2.3 Digital Twin Technology in Financial Services

The concept of the Digital Twin (DT) originated in manufacturing and engineering, representing a virtual replica of a physical entity that evolves in real-time based on incoming data. Recent research, such as that by [9] explores the expansion of DT into service industries, including healthcare, logistics, and finance. In financial services, DTs can simulate user behavior, financial status, and decision-making patterns, enabling a more proactive advisory model. The integration of DT with financial tools is still nascent but holds great promise for enhancing personalization and decision support.

2.4 Hyperpersonalization in FinTech

Personalization in financial services is evolving into hyperpersonalization, which leverages real-time data, behavioral analytics, and AI to deliver deeply customized financial solutions. According to [10] hyperpersonalization is expected to be a key driver of customer loyalty in digital banking and wealth management. Works by [11] suggest that blending real-time data modeling with predictive analytics can lead to more meaningful customer experiences and engagement.

2.5 Gap in Existing Literature

Despite significant advancements in robo-advisory systems and AI integration, there is limited research exploring the combined use of digital twin models and AI for real-time, hyperpersonalized financial planning. Most existing robo-advisors operate on static profiling and lack the dynamic behavioral modeling necessary for deep personalization. This study aims to bridge this gap by proposing a conceptual framework for DT-enabled robo-advisors that can continuously learn and adapt to individual user behavior, financial goals, and life events.

3. FINANCIAL TECHNOLOGY AND ROBO ADVISORY

In its original sense, "financial technology" included all consumer and trader-facing back-end technologies used by financial firms. Automatic teller machines, or ATMs, were first introduced by Barclays Bank in 1967 and are considered a watershed moment in the history of banking equipment [12] . Financial education and literacy, retail banking, investing, and even currencies like Bitcoin have all been included by this term since its use began at the turn of the millennium [13].

Money-related technical innovations, including instruction and instruction, retail handling of accounts, payments, and even the digital currency and other digital currency, are all part of the financial technology (FinTech) industry [14]. The proliferation of financial technology companies is characterised by the adoption of six distinct business approaches. Among them, you may find services related to protection, fundraising, money markets, payments, and management of assets [15].

Some examples of both incremental and revolutionary innovations brought about by FinTech's ongoing expansion include electronic banking, mobile money, crowdsourcing, P2P lending, and online identity robo-advisory [16]. The FinTech company's robot advisors may predict and forecast the customer's portfolio balancing based on the robo-advisor's investment techniques. This is achieved by evaluating investment plans and hazards to ascertain their effect on the future of financial stability [17]. Analogue technology, digitalisation of economics, and the FinTech age are the three distinct periods that may be used to classify the technological progress of financial services [18]. Robotic investment advisers, or robo-advisors, are online services that build and manage client portfolios autonomously using AI. One reason they are made is to replace expensive human consultants. After first appearing as FinTech companies during the 2008 financial crisis, robo-advisors have now established themselves as a mainstay of the financial services sector, especially with the entry of more conventional banks into the market [19].

The use of robo-advisors is on the rise around the globe. More than 70 robo-advisors were active in Europe in 2017, with five of them managing assets exceeding EUR 100 million [20]. It was also noted that robo-advisors are gaining traction in developing economies. In Asia, for instance, robo-advisors are proliferating because to rising incomes in the middle class and extensive access to the internet. A number of nations have already begun using robo-advisors; they include Vietnam, Singapore, Japan, India, Hong Kong, and China (mainland). Other developing economies also have robo-advisors, although their numbers are much less for now. Just six robo-advisors exist in the whole Latin American and African continents put together.

According to robo-advisors start by tailoring an investment plan to each client's unique goals and comfort level with risk. The goal of the investment and the user's time horizon are two questions that robo-advisors ask. Through financial techniques, robo-advisors may assist users in reaching a number of goals, including retirement, major organising, building funds, and providing a source of revenue to support living needs. To gauge a user's comfort level with and aptitude for handling risk in various contexts, robo-advisors will pose both objective and subjective questions. Robotic investment advisers use these two criteria to inform their recommendations for allocating capital to various asset classes. Portfolio selection informs these algorithms. People who aren't used to having simple and reasonable access to expert financial advisers may be encouraged to engage in more sophisticated investing techniques by robo-advisors due to their accessibility and low cost. What follows is an overview of DT and its potential applications in the FinTech industry. It is believed that DT, which is still in its infancy, will drive robo-advisors to the next level of FinTech growth.

4. DIGITAL TWIN

Many businesses may use digital twins in different ways. To better educate and teach students in cardiovascular wellness, for instance, specialists in the field may use digital replicas to create an accurate 3D representation of the cardiovascular system in humans. In certain instances, this helps shed light on previously unknown information. Beyond that, digital twins may revolutionise product and equipment maintenance for companies. This is made possible by use of in-device sensors that communicate with a virtual twin in order to provide information on the devices' functionality. Profitability is greatly enhanced when companies are able to anticipate and resolve issues before they arise [21].

Thanks to the ever-expanding capabilities of the internet and related digital technologies, having a digital twin allows individuals to enhance their productivity and efficiency. Acceleration in innovations and understanding development is occurring in many domains, including healthcare and planning for cities, thanks to the internet of things (IoT), artificial intelligence (AI), and neural networks. It cites digital twins as having several applications in healthcare, which includes as diagnosis, surveillance, an operation, healthcare equipment, studies regarding novel medications, and regulations. Furthermore, digital twins allow for the evaluation of some medications by physicians before they do clinical studies on actual patients, which helps to ensure the safety of patients. One example is a digital heart twin created by Siemens Healthineers, a corporation that puts a lot of money into digital technologies like AI. This helps doctors make accurate diagnosis. The digital heart twin also reduces healthcare costs and avoids needless surgeries.

The use of DT simulation in urban design opens up new avenues of creativity for smart city developers. By transforming a city into a three-dimensional model, they help academics examine future urban planning and infrastructure. Data provided by digital twins, which was made possible by the internet of things and the use of cloud computing, allows city planners, engineers, and architects to better envision their communities [22-27]. One Chinese company, 51World, used 3D modelling software to build representations of Singapore and Shanghai [28]. The 3D digitally city model is a prime example of the smart city virtual reality movement as it provides a framework for investigating potential upgrades to city infrastructure including subways, roads, and traffic lights.

Improving decision-making speed and accuracy while maintaining faultless execution is essential for businesses to achieve exceptional and long-term commercial value. To make wise choices in this altered world, DT may hold the key. DT, or lifecycle modelling, is the practice of creating a digital model of a physical thing or system. The model uses reasoning, algorithmic learning, and simulations to help executives understand that item or system better [29]. Making a very detailed digital replica of a real object—its "twin"—is one such example. The "thing" may be anything from a person to a network of interconnected sensors that track their digital or bodily movements and reliably provide data usable by the virtual model. To sum up, DTs are able to collect useful information on the real-world performance of physical objects. To enhance the robo-advisor's skills, DTs may simulate real-world events in VR.

DT would keep track of everything, run simulations to see how the framework would perform in different real-world scenarios, and then give the physical twin advice based on those results. Also, without really putting the real-life twin through its paces, we may evaluate and simulate its potential operation in various environments by building DTs [30-33]. The great thing about DT is that it can discover our unique patterns of behaviour and the data we generate, especially when it comes to our financial dealings. Based on this information, it can then provide tailored ideas and recommendations.

5. RESEARCH DESIGN

Since digital twins are still a novel concept, this study is purely experimental. Research on robo-advisory services for managing personal finances is limited. This study opens the door for future scholars to delve further into the topic. In order to get a deeper comprehension of the subjects being studied, exploratory research is often qualitative. The study's goals were achieved via the use of secondary data collecting. In order to help develop a comprehensive

and successful review before offering a framework, the study suggests a three-stage procedure for doing a literature review. There are three steps to the suggested literature review process: (1) gathering relevant information, (2) analysing it, and (3) drawing conclusions. The process's inputs stage will deal with problems related to finding relevant books. The first step in processing literature is to classify it according to your preferred method of interpretation (e.g., cognitive/construct-level, literary streams, or theories). Writing the literature review and detailing how the existing body of knowledge affects the suggested framework are examples of tasks handled in the outputs stage of the process.

6. ROBO-ADVISORS AND DIGITAL TWINS

There were three phases to the bibliographic examination of pertinent work in the investigated domain: (a) gathering relevant work, (b) screening relevant material, and (c) rigorously reviewing and analysing related state-of-the-art work. As a first step, we combed through a bibliographic study of Scopus-indexed publications using the phrase "Digital Twin" to find relevant conference papers and articles in Google Scholar and Scopus. Most studies on digital twins have focused on cyber-physical systems, smart manufacturing, machine learning, the internet of things (IoT), and Industry 4.0 (Figure 1). Research on financial technology that makes use of DT is severely lacking. As a result, future studies on FinTech and robo-advisor trends may benefit from this work.

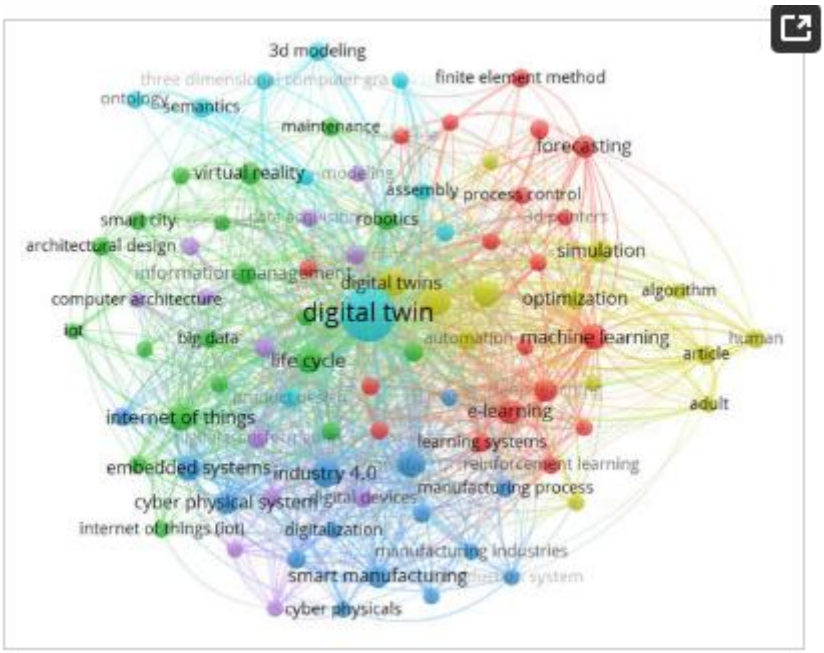

Figure 1: Analysis of digital twin bibliography

The widespread use of smartphones is propelling the creation of financial robo-advisors that work with DT. By digitally identifying, tracking, and recording individual actions, value may be retrieved and evaluated. As more and more people use their cellphones to access the internet, the trend of increasing use of cell phones is indicative of people's overreliance on these gadgets. Some examples of what people do online include making purchases, investing, interacting on platforms such as Facebook, and engaging in e-commerce. A lot of people's day-to-day financial dealings now take place on smart mobile devices like desktops and cell phones, which also serve as tools for managing money whenever and wherever it's needed.

In conventional robo-advisor services, individual data are utilised ad hoc and have little value. A robo-advisor, for instance, may be anything from a website to an app that can suggest a portfolio of investments depending on the user's risk tolerance and financial goals. It is only the data collected from each person's digital footprint and does not reflect the overall financial trend or position. As a result, people may not be able to rely on information to provide precise and comprehensive insights that might lead to the creation of novel products, services, company models, and financial approaches. This is that the digital information they produce does not allow them to get a comprehensive knowledge. Figure 1 depicts a digital twin situation that improves robo-advisors' capacity for managing personal finances. The concept draws attention to both the digital and physical ecosystems' interdependence, integrated nature, and cyclical nature. At its heart, its electronic twin facilitates non-traditional forms of conversation among knowledge-builders. The robo-advisor represents a potential future state of individual wealth management. See the following figure for an example of a DT-enabled robo-advisor. This kind of technology will include personalised data and function similarly to a digital twin. IoT, gauges, the internet of things, and intelligent mobile phones generate unprocessed information that may be tracked back to people' online banking actions. All of a person's digital actions are monitored, documented, taken out, and evaluated to provide predictions, analysis, and suggestions. Anyone may view, edit, and connect with their DT in an interactive way to get advice and alternatives. Intelligent two-way communication between DT and its users enhances DT's robo-advisor capabilities, allowing for better advice and recommendations for handling assets, retiring, making investments, learning, storing, diligence, managing risks, and numerous other areas that greatly benefit users' financial oversight and overall welfare.

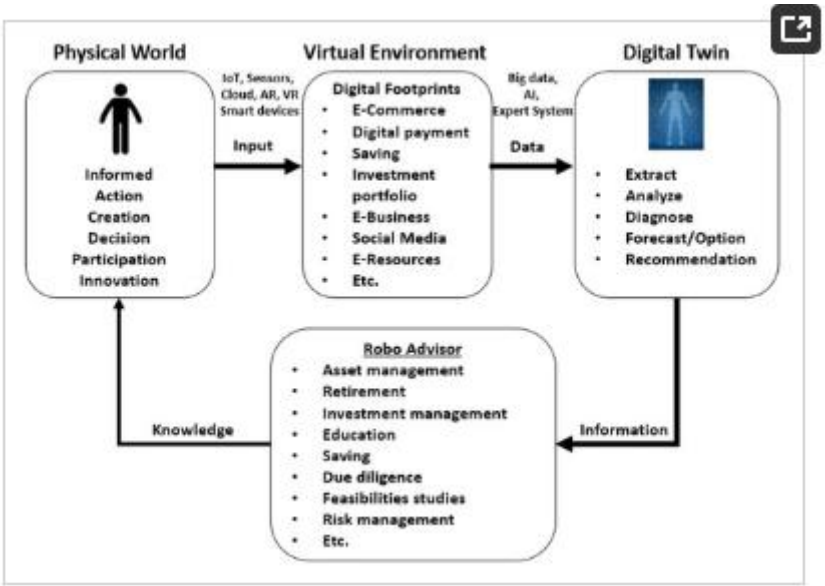

Figure 2. A financial robo-advisor that has been equipped with a digital twin

Integrating robo-advisor with a digital twin will make it a foundational platform that people can rely on for far better financial outcomes. Rather just being static, the robo-advisor system will evolve into a full-featured electronic adviser platform with interactive features to ease the burden of complex financial choices in the future. A user's electronic routines may be extracted and analysed comprehensively across each of their e-services for this purpose. After this is done, the computer model will provide information according to the entire data continuity anytime there are important problems or issues that need to be conveyed to the physical user.

When DT is activated, robo-advisors may transform into powerful platforms that maintain tabs on an individual's financial tracking around the clock. Based on technological assets that are updated regularly in real time, DT is capable of tracking any movement—positive or negative—that might affect an individual's investment. Anyone may get a real-time alert whether the investment they made is going to gain or lose money. The results of the study inform DT's recommendation of potential solutions, which it then communicates to the user. Among the user-recommended activities are those that are absolutely necessary and those that need rapid attention. The core of a digital twin for problems avoidance and treatment is the synchronisation of information across both digital and physical networks in near real-time. To summarise, consumers may get business and financial recommendations from the digital twin via the integration of information, which depends on the collection of e-commerce information and e-resources.

By using a digital twin, individuals may see the real-time performance of their financial well-being and improve their skills. The data collected from the digital twin may be used for planning and establishing objectives. The prediction will monitor developments and make judgements using state-of-the-art modelling approaches, beginning with the present. The optimum course of action may be determined by analysing different action possibilities, measuring their capacities, and calculating the resultant cost function once finance robo-advisory is prepared for acceptance DT.

At last, what role does the research and development of DT technologies play in paving the way for the future generation of FinTech? Every aspect of a person's digital footprint—their online purchases, digital wallets, online businesses, social media engagement, and more—contributes to their financial habits, and the digital twin can help humans keep track of all of this data. Consequently, by incorporating DT's suggestions for improvements into their FinTech framework as a robo-advisor, they will be able to get a complete understanding of themselves in close to real-time. To better themselves, people may utilise DT to track the progress of their economic circumstances in the present moment. Individual growth and organising may benefit from the data collected via DT. With DT incorporated into FinTech systems, people can figure out what to do next once they've weighed their options, figured out what they're good at, and calculated the subsequent cost functions.

7. IMPLICATIONS AND LIMITATIONS

Researchers, businesses, and businessmen may use this study's practical consequences to inform decisions about robo-advisory's platforms future directions. Individuals' big data, especially their banking information, will be captured, reflected, and displayed through DT within the framework of their financial decisions. Concerning limitations, the study's suggested framework was built using a qualitative method, which has its own set of problems. As further study progresses, the model will be refined into a working prototype.

8.CONCLUSION

Our research aims to shed light on the features and possibilities of robo-advisors that are equipped with DT. Employing DT has two main benefits. Above all else, it will train consumers to get the most out of financial technology services and provide them the tools they need to take part in a wide range of evolving knowledge-creation and innovation mechanisms. Second, since users may take charge of their own education and experience, it may make managing one's finances easier and more efficient. The use of robotic advisers is on the rise and will

continue to be high as technological advancement continues to show swear in a variety of areas, including challenge prevention, cost and time savings, effectiveness, service enhancement, accessibility, inventiveness, and understanding generation. Due to the fact that technology known as DT is in its early stages, it will take some time before it achieves its full capabilities. If the finance and service sectors want to maximise the advantages of innovation, they must identify and resolve the concerns voiced by the DT. For those seeking to use data as a new kind of value co-creation, a robo-advisor equipped with DT abilities might be the perfect foundation.

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