THE INFLUENCE OF ARTIFICIAL INTELLIGENCE SYSTEMS IN THE FUTURE ENVIRONMENT OF FINANCIAL OPERATIONS

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Abstract
The technological progress incorporated under the artificial intelligence umbrella is more and more embraced in the finance industry. The constant development combined with particular social situations (COVID, post-COVID) had speed up the usage of artificial intelligence systems in the finance industry. Consumers are now exposed on a regular basis to finance systems as bank applications in which they can choose from simple to more complex operation. Applications interfaces are becoming more and more user-friendly, and consumers tend to trust it, those being an extension of the bank institution. In our research, we investigate the attitude of consumers towards offering trust in finance artificial intelligence systems that can provide advice and operate financial investments based on historical data and their economic future estimations. For financial systems to proceed with these recommendations, the main aspect will be the acceptance to share their private data, based on which artificial intelligence will create a personalized profile in terms of consumer behaviour and interests.

Keywords
Consumer, finance, artificial intelligence, trust.

JEL Classification
G41

Introduction

The use of online environments has increased worldwide, changing people's way of communication, and making decisions in various fields. The usage of different online applications has increased significantly during the last few years. Among these, the online finance systems, as, for example, the banking applications are started to be used on a regular basis by users from different social environments. Those are focusing on deliver a more user-friendly interfaces that allow users to easily navigate and operate in it. Being also a bank institution annex, the user trust in it tends to be higher, like the one offered to the institution itself.

However constant efforts are made to develop more finance systems transforming them into artificial intelligence systems that can learn from historical data and create their own

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projections in terms of future investments rentability. To make this development more efficient and easily embraced by consumers, an important aspect will be the consumers to provide their personal data. All this information can help artificial intelligence systems to deliver personalized advice in terms of using the income more wisely, in line with the consumer behaviour and interests.
The following step could be for consumers to trust more these systems and allow them to make financial decisions in their names. We analysed the consumers openness to this approach and if it can offer a greater safety feeling in terms of making the most efficient financial decisions that can generate optimal results and a higher financial security.

1. Review of the scientific literature

In modern times, due to the significant usage of online environments, the term digital finance has become more and more used (Pelau, 2021). This refers to multiple type of services, including digital wallets and online payments (Douglas W. Arner, 2016). These kinds of services had developed significantly during the last years, being used all over the world.
The e-Commerce industry has registered high development, in principle marked by the user-friendly interface and by how easy people can now make online shopping (Wang & Huang, 2023). Furthermore, digital payment possibilities, for example, online payment or credit card option, had led to an important increase in online purchases (Wang and Jung). These will lead in the future to an increase in consumption, in general (Agarwal and Chua, 2020). The actual technological progress allows users to make secure payments, avoiding the risk of theft and fraud (Zhu, 2023).
A study developed by the World Bank has led to the conclusion that the use of the digital financial services has increased the transaction value made by consumers using electronic payments and decreased the cost of making transactions.
Hanif et al. (2022) mentioned that digital finance had a positive impact on online purchase intentions. In the same perspective, Wang and Huang (2023) found that embracing digital finance had a good impact on consumers' intention to make online purchases.
Consumers who use the online shopping environment, therefore a part of digital finance, are the ones that tend to make repeat purchases in comparison to those who still using the traditional payment forms (Wang and Huang,2023).
A possible reason behind this could be that the digital environment is secure and usage-friendly and therefore has provided trust among consumers (Pelau, 2020).
Since consumers can make secure and easy purchases online from anywhere in the world and at any time, the impulse in buying has increased (Chang, 2013). This has also transformed the way advertisers promote their products among consumers - for example, it focuses more on digital marketing by adapting relevant content to specific online platforms (as Tik Tok, Facebook, Instagram). Multiple studies mentioned that consumers who tend to use digital finance and make online payments are inclined to spend more in comparison to the rest (Chauhan, 2021).
With the technological development in the online environment, also the banking sector has enlarged its financial operations possibilities also. As consumers demand a more user-friendly, personalized, and faster response rate from banks, digitalization began to be more and more important for banks to remain competitive. Therefore, a significant

number of banks had invested in developing their own mobile banking services (Komulainen and Saraniemi, 2019).

The progress registered in the digital banking area has conducted to the development of innovative services and products, for example, online payments, mobile banking, and robo-advisory. However, one factor that has direct influence on mobile banking usage is represented by the trust factor from the consumer side (Hanafizadeh ,2014).

Krogfoss et al. (2011) proved that end-user satisfaction and the quality of experience have a very important role. Furthermore, in the banking sector, a major advantage of mobile banking is its characteristic of providing an enhanced streaming role. During an m-banking application, consumers have the possibility to switch between different applications, generating a more immersive experience. At the same time, users could access many services in a short time and with ease. The high quality that mobile banking services has registered in the last period also has an important impact on customer loyalty (Yusfiarto, 2021). As proved, loyalty can be quantified based on repurchase intentions (Heskett et al., 1994).

Regarding the digital finance environment, the actual state in the financial investment environment towards clean energy markets (Huynh et al., 2020) and to different fields such as AI and Bitcoin (Huynh et al., 2020) has increased the interest in research on these segments. The importance of technology and bitcoins has been analysed by Pineiro-Chousa (2021), who mentioned that their importance depends on the country's policies that prompt it.

Factors such as the COVID-19 pandemic period, Brexit or the global financial crisis that occurred between 2008-2009 influenced greatly the financial environment worldwide, based on these numerous studies related to risk-return benefits and investors' interests in portfolio diversification (Dao et al., 2019).

Nowadays, the easy access to financial information combined with the desire of consumers for a more safety financial situation has led to an increase interest in investment financial field.

Some studies even indicated that for Bitcoin it has qualities like important metals like gold and that are in an unstable state during speculation moments (Lopez-Cabarcos,2021).

However, an important aspect refers to the financial education that users have access to.

In developing markets, the young generation faces hard conditions such as low employment and limited access to economic opportunities. In some cases, these circumstances may lead to speculative financial decisions with high-risk involvement.

The actual meta-analysis has shown that financial education can generate a positive impact on future financial behaviour (Kaiser, 2020).

The constant development in technology has a major impact on finance (Lee, 2018), where consumer trust is more and more needed.

Also, considering a potential near future, in which a robo-advisor may be used by the consumers to generate recommendations for investments placements, analysing all the possible options in the market and predicting various scenarios, which in our actual reality tends to be perceived as a difficult and complex task for which the consumer has to be very well prepared, may become an important opportunity in the financial system. (Shanmuganathan, 2020).

2. Research methodology

The main objective of the study was to determine the consumers perception regarding the use of artificial intelligence usage in the finance area. Considering the constant efforts that are made to develop artificial intelligence systems in the finance area, starting with simple banks applications, we can imagine soon a potential virtual personal financial advisor that can make recommendation to consumers for efficient financial investments placements by analysing the current economic environment and developing its own predictions. In this scenario, consumer trust becomes a very important pillar that we further analysed.

Another important aspect is related to the comfortable state that an artificial system can offer to the consumers by providing a friendly usage interface and a real-time navigation feature.

Also, having the possibility of using large volume of data base from which it constantly learns, and it designs its own predictions, an artificial intelligence system may also provide more efficient recommendations in terms of financial placements, offering the consumers a higher security feeling in making the optimal decision. A very important premise that needs to be assured for an artificial intelligence system to perform in an efficient manner, its represented by the large data base that it can access. The data base should be formed by a large amount of information gather from the consumers, from this perspective the consumers acceptance to share their private data represents a very important aspect.

In order to fulfil the proposed objective, an online study was developed. Data collection took place with the help of an online questionnaire having as respondents' people who already have experience in using AI and other new technologies for financial activities. Based on the number of people who have the experience of working in finance, a convenience sample of 148 respondents was gathered. It contained two types of questions: usual and unusual questions.

The usual questions referred to actual developments that are currently used in high proportion within the financial field by the consumers, while the unusual questions were built considering a potential near future feature that may be implemented. The purpose of the questionnaire was to identify the attitude of consumers toward offering trust to an artificial intelligence system used in finance, that can provide recommendations and operate financial investments based on the market historical data and their own economic future estimations.

The sample included consumers from different age groups, levels of education and income, making the research valid and comprehensive. Considering the field for which the research was developed, respectively the finance area, in terms of age groups, the respondents were above 18 years old, therefore eligible for using financial services.

The questionnaire contained 15 items, measured with values scale from 1 to 5, where 1 means that the respondents agree little with the question and where 7 means that they fully agree with the statement. The analysis was based on the average values, used to build comparisons between the groups.

The analysis was develop considering the average values obtained at each item by the respondents split in two groups based on their financial experience, therefore the first

group included the respondents with more than 5 years of experience in finance and the second group was form by the respondents with less than 5 years of experience in finance.

Table no.1. Sample's group demographic information

Measure	Item	Participants
Gender	Male	53%
	Female	47%
Age	Under 18	0%
	18-24	42%
	25-39	22%
	40-59	34%
	60 or older	3%
Education level	No high school education	0%
	High school graduate	27%
	University bachelor's degree	45%
	University master or doctoral degree	28%
Income	Under 3.000 Ron/ month	28%
	Between 3.000 Ron-5.000 Ron/ month	24%
	Between 5.000 Ron-7.000 Ron/ month	18%
	Between 7.000 Ron-9.000 Ron/ month	7%
	More than 9.000 Ron/month	23%
Experience in finance	Less than 5 years	62%
	More than 5 years	38%

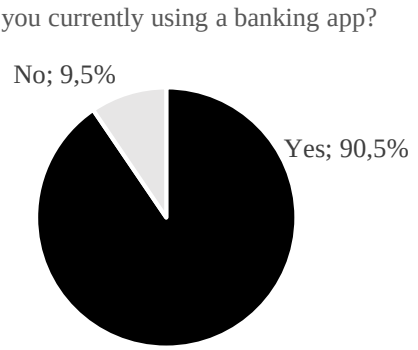
Source: Own research study

3. Results and discussions

Considering the limited number of respondents, due to the niche field analysed, the first point in the survey was to identify how many people from the total respondents were currently exposed and were actively using a basic artificial intelligence system from the financial spectrum. In this regard, more than 90% from the total respondents were using a banking application, in which they can easily check their financial situation in real-time and operate different financial operations, from simple to a more complex one.

Analysing the responses given, more than 90% of the total respondents were currently using a banking app, having access to an actual form of artificial intelligence financial system.

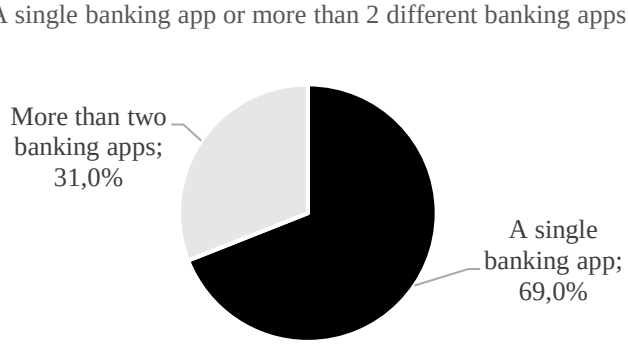
Figure no. 1: The actual usage of a banking app



Source: Own research study

16% from the respondents that are using an app mentioned Revolut.
In comparison with the traditional banking institutions that during time, developed their own financial apps, Revolut was launched in 2015, becoming an all-in-one finance application that empowers consumers to manage their money, being present in 160+ countries.
According to Wikipedia, Revolut was founded by a former investment banker (Nikolay Storonsky) and a software developer (Vlad Yatsenko) from their personal frustration regarding the hostile foreign exchange rates, hidden costs and insufficient transparency while traveling abroad.
Revolut's path started with an objective to simplify banking, assure transparency, and empower the consumers.
This is a free application that combines payments, investments, banking services, making it a versatile financial instrument for modern-day life (Maddy Scheckel, 2024).
In order to gain consumer confidence, the application provided multiple benefits that attracted the customers in testing the platform, such: fee-free currency exchange (upon to a certain limit), instant global payments (without extra-fees between users), investment opportunities (trade U.S. stocks with a certain number of commission-free trades per month), saving accounts, budgeting tools (real-time insights regarding the spending behaviour) and debit card (access to over 55,000 fee-frees ATM).
Also, the application is contributing to develop financial education by creating an interface that provides real time insights regarding the spending behaviour, grouping the expenses and illustrating trends. Therefore, is stimulating its users to refine their financial governance and make more wise financial decisions.
From the total respondents that were using a banking app, 69% mentioned only a single banking app, while 31% mentioned more than 2 different banking apps.

Figure no. 2: The number of the banking apps used



Source: Own research study

The next factor analysed was related to the consumers benefit of using a banking application for better controlling their personal financial situation, having a real time access to all their private financial information.

Therefore, from the experience in finance perspective, both groups (less than 5 years' experience in finance and more than 5 years' experience in finance) tend to highly agree that this is a real benefit that helps them control their income in a more efficient manner (more than 4.000 average scores for both groups). From the ones that provided a high score (4 and 5) for this question, more than 47% are between 18-25 years old.

Related to the banking applications usage, the further topic analysed was regarding the frequency of using the card payment method. For this item, similar with the previous one, both consumers groups, the group with less than 5 years' experience in finance and the one with more than 5 years' experience in finance registered high average values scores in terms of card payment usage, slightly higher for the ones with less than 5 years' experience in finance (4.761 score). The T-Test result for this item was in value of 0.300 and it reflected similarities in responses between two sample groups. 43% from the respondents that provided a high score for using the card payment method are between 18-25 years old. This result could be due to the digitalization and contactless payment that significantly registered development (Romania Insider). Contactless payments registered the highest increase of all card payments at the POS over the three years since SPACE 2019 was conducted, up from 41% in 2019 to 62% in 2021.

Regarding the knowledge of existing in the market the possibility to automatically operate payments for the utility bills, with the help of banking applications, both respondents' groups achieved high averages values, with the mention that the respondents that had more than 5 years of experience in finance, registered a higher average that the ones with less than 5 years of experience in finance (4.679 average score versus 4.326 average score). The T-Test result was in value of 0.106 score, reflecting a slight difference in approach between the two sample groups. The group composed from the respondents

with more experience in finance, tend to know more about the latest features available in the market.

From the respondents that offered a high score, 56% are between 18-35 years old. This could be due to the factors like financial education programs targeting young public, teaching them about modern financial tools and services, convenience and efficiency insight (no need to remember the payment terms for each utility bill), shift to online transactions and COVID 19 Pandemic that increase the usage of digital payments at global level. In terms of using the banks applications for paying the bills, the respondents with more than 5 years of experience in finance, had a slightly higher average score of 3.571 in comparison with the group with less than 5 years of experience in finance that registered an average score of 3.196. Nevertheless, for both groups the scores were relatively lower in comparison with the averages scores obtained for really knowing the products. The T-test result for this statement was in value of 0.350 representing a small difference in opinion between the two groups. The significant score difference between knowing of paying the bills automatically and using this kind of products could be generated by preferring the traditional methods of paying or the trust issues concerning the security of the payment made on time, with no potential late fees generated by the service provider.

56% from the respondents that provided high score for using the banks application for paying the bills where between 18-35 years old.

The technical characteristic that allows the consumers to make with a regular frequency, automatic payments for the utility bills was considered useful within a higher proportion by the consumers from the group with less than 5 years of experience in finance (4.370 average score), while the consumers from the first group with more than 5 years of experience in finance registered an average score of 3.929. The difference in opinions was notable for this item, T-Test result obtained was in value of 0.102.

From the total respondents that offered a high score at this item, 60% where between 18-35 years old. This could be due to the convenience factor (a particularly appealing to the younger generation who are accustomed to digital convenience), security of online payments and even credit score improvement could be considered due to the fact that regular and timely payments can improve one's credit score (this category of age representing an important share of the total mortgage credits from the market).

Regarding a complete automatization of the banking services within a digital platform without any human interaction, the group with more than 5 years of experience in finance, tend to be less open to this perspective registering an average score of 3.750, in comparison with the ones with less than 5 years' experience in finance that registered an average score of 3.978. For this question, the T-test result reflected similarities between the two sample groups, being in value of 0.408.

In the last years, Romania registered a high digital adoption rate that could translate in the fact that many consumers could be comfortable with fully automated banking services in the near future. However, a part of the consumers may still prefer the human interaction for certain banking services. The trends may change due to multiple factors such as constant technology development, changes in consumers financial behaviour or regulatory modifications. From the data access point of view, analysing if the respondents agreed that an AI- powered financial system would have access to the consumers private

data, the respondents from the group with less than 5 years' experience in finance, registered higher average score in value of 3.000 versus the ones with more than 5 years' experience in finance that had an average score in value of 2.321. The T-test resulted in this case is considerably lower, in value of 0.057 that suggest a higher difference in opinions between the two groups. This result could be generated by the fact that consumers with more than 5 years' experience in finance have more private financial data collected, due to higher number of years of experience and tend to trust less an artificial intelligence system that may have complete access to their private financial data.

The score offered to this item could be directly related to the privacy concerns, financial data being a very sensitive information that could be exposed to cyberattacks or identity fraud. A considerably lower T-test result, in value of 0.009, was obtained regarding the agreement concerning that an artificial intelligence system could provide recommendation on managing the consumer's income. For this statement, the group with more than 5 years of experience in finance achieved an average score of 2.643, while the consumers with less than 5 years of experience in finance achieved an average score of 3.500, resulting a T-test in value of 0.009.

There was noted a considerable difference in opinions for both groups, that could represent that the consumers with less than 5 years' experience in finance tend to be more open at this hypothesis.76% from the respondents that provided a high score to this item where between 18-35 years old, this could translate into the fact that the younger generation trust more the artificial intelligence systems being more a digital native than the previous generation.

Regarding the premise that an artificial intelligence system would automatically perform any type of financial operation in consumer's behalf, using information from their personal data, the average scores achieved were significantly different between the two groups. The first group with more than 5 years' experience in finance achieved an average score of 1.750 while the group with less than 5 years' experience in finance achieved an average score of 2.891. For this item, the T-test result was in value of 0.001, that indicated a major difference in opinions between the two groups. Even thought, the group with less than 5 years' experience in finance tend to be more open to this premise, the average scores obtain for both groups reflected the people caution in offering access to an artificial intelligence system to operate automatically financial operations in their behalf.

57% from the respondents that noted a low score for this item are 35+ years old.

This could be related to not trusting the financial institution artificial intelligence systems due to the lack transparency in how exactly it would manage to automatically perform any type of financial operation and also the security concerns that may cause potential data breaches or even unauthorized access to personal financial information.

Regarding the possibility that an artificial system in the finance field to decide and operate a financial investment in an automatically manner, using deep learning process, both respondents' groups obtained lower average scores. The group with more than 5 years of experience in finance achieved an average score of 1.929, while the respondents with less than 5 years of experience in finance achieved an average score of 2.826 resulting a T-test in value of 0.005. An important difference in terms of consumer's perception was identified between the two respondents' groups, the group with more than 5 years of

experience in finance tend to be less open in trusting an artificial intelligence system to automatically make any type of financial operations in their behalf.

This could be related to the people risk tolerance and the need to consult with a financial advisor before any investment decision. The need for an approval before, an artificial intelligence system to make any type of financial operation was analysed further. For this item, both respondents' groups achieved high average scores: the group with more than 5 years of experience in finance achieved an average score of 4.500, while the respondents with less than 5 years of experience in finance achieved an average score of 4.283. The T-test result was in value of 0.421. Therefore, for this item, both respondents' groups tend to have the similar opinion, that their approval is mandatory before an artificial intelligence system to implement any type of financial operation on their behalf, using their private financial data.

This may be in direct connection with a general lack of trust in artificial intelligence among population and also due to privacy concerns and even algorithm aversion. However, attitudes towards financial artificial intelligence systems may modify over time as technology progresses and becomes more present into our day by day lives. The next item analysed offered information about the respondent's attitudes towards the hypothesis that an artificial intelligence system would manage in a more efficient manner a family income. The first group, composed of respondents with more than 5 years of experience in finance registered an average score of 2.393 while the second group with less than 5 years of experience in finance registered an average score of 3.196. The T-test value in this case, resulted in value of 0.005, this representing a significant difference in respondents perspective concerning the topic, therefore the second group tend to be more open to the approach that an artificial intelligence system may offer more efficient financial recommendations that translates towards a more secure financial environment.

Similar with the previous item, regarding the security feeling that an artificial intelligence system used in finance can offer to its consumers, there was a significant difference between the two analysed groups. The respondents with more than 5 years of experience in finance achieved 2.500 score while the respondents with less than 5 years of experience in finance achieved 3.109 score, obtaining a T-test result of 0.043. Therefore, the second group, with less experience in finance, tend to trust more an artificial intelligence system for making more efficient decisions from finance investments perspective and believe in achieving a higher security feeling concerning their financial situation.

The tendency is for the respondents to agree with the utility of using actively different forms of financial AI systems like bank services, applications, card payments, these registering high scores (example: 4.9 score for card payment method) but not trusting AI in the future perspective to automatically decide a particular investment (lowest score: 2.5)

Still, the average score for considering that AI can make a more secure decision in terms of financial perspective (3.4 score). The expertise in finance was considered an important aspect, based on which the analysed was developed. The results below 0.10 represents main differences between the two groups of respondents, analysed from the perspective of time experience in finance.

Respondents with more than 5 years of experience in finance tend to be more open for an artificial intelligence system to have access to their data and to provide recommendations on how to manage their income.
However, regarding the possibility of the artificial intelligence to automatically perform different types of financial operations, both respondents' groups tend to not agree with this feature and are highly requesting their approval before making any operation.

Table no.2. Analysis of the use of AI in finance based on experience

Question	Experience in finance		T-Test analyse
	More 5 years (avg.)	Less than 5 years (avg.)	
Do you think that a bank application helps you to control your disposable income more efficiently by checking your banking situation in real time?	4.107	4.326	0.408
How often do you use card payment?	4.571	4.761	0.300
Are you aware of the existence of automated payment of utility bills with the help of banking applications?	4.679	4.326	0.106
Do you use these banking apps to pay bills automatically?	3.571	3.196	0.350
Do you consider it useful to automate the payment of utility bills?	3.929	4.370	0.102
Do you consider that a complete automation of banking services be comfortable, respectively, solving all requests within a digital platform (without human interaction)?	3.750	3.978	0.408
Would you agree that an AI-powered financial system would have access to all your data?	2.321	3.000	0.057
Would you agree to such an AI-powered financial system to provide you with recommendations on how to manage your income?	2.643	3.500	0.009
If such an artificial intelligence-based financial system existed, would you give it permission to automatically perform any type of operation for you, based on your consumer profile?	1.750	2.891	0.001
If you wanted to make an investment, would you opt for it to be decided and made automatically by a financial system based on artificial intelligence?	1.929	2.826	0.005

In case of a decision taken by a financial system based on artificial intelligence, do you consider it necessary to provide your consent before making it?	4.500	4.283	0.421
Do you think that such an AI-based financial system could manage your own or your family's income more effectively than you?	2.393	3.196	0.005
If you were to use such an artificial intelligence system, do you think it would give you greater financial security than you can obtain?	2.500	3.109	0.043

Source: Own research

Conclusions

The online environment continues to have a major impact on how people interact with each other and with different institutions. Constants efforts are made to develop artificial intelligence systems that can be implemented in different areas, to facilitate people day by day life.

Artificial intelligence systems are more and more integrated in our modern life, starting with the smartphones, smart home appliances, self-driving cars, voice assistants, security systems, surveillance cameras for facial recognition, developing also in the financial sector for investment recommendations.

Considering the limitation of the data collection, being a more specific area, using therefore a convenience sample of 148 respondents, the premise is that the consumers are already exposed to a various forms of artificial intelligence systems implemented in finance field also. For an easy usage and accuracy in providing information, the technology progress is more and more present in the finance environment. An important aspect in this development is the perception of consumers and trust that these kind of artificial intelligence systems will be able to perform more efficient financial operations from simple to more complex ones. Considering the machine learning mechanism implemented in finance that can evaluate financial markets and provide recommendations, based on a large data analysis and evaluating multiple scenarios, consumers with less than 5 years of finance experience tend to trust more that these systems will generate better results in terms of investment efficiency and provide more financial security. However, an important aspect is related to the approval from the consumer side, for the artificial intelligence systems to automatically operate investments. In this consideration the respondents, no matter the experience in finance, tend to not agree with, even though they understand the benefits of using artificial intelligence systems. Therefore, the consumers require to provide their approval in order for an artificial intelligence system to be able to operate different financial operations. This could be in direct connection to data privacy issues, financial data being a very sensitive information. Also, other factors such as the lack of understanding how does a financial

artificial intelligence function, the absence of control over their financial decisions or the fear that a financial algorithm may generate errors could influence directly the people trust in artificial intelligence in financial sector.
However, based on a constant effort of developing artificial intelligence in the financial sector, in the near future this could play an important part in improving financial decision and generating high quality investment recommendations.

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