

**ARTIFICIAL INTELLIGENCE (INT 404)**

**Report**

**AI in finance (Personalized Banking)**

**Group Members**

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| --- | --- |
| **Section: K21GP** | |
| **Registration no.** | **Name** |
| **12106661** | **Aman Kumar** |
| **12210904** | **Kallam Charan Reddy** |
| **12113712** | **Zair Hussain** |

**Abstract**

AI has transformed the way personalized banking is conducted. Personalized banking entails tailoring financial services to meet individual customer needs. AI has made this possible by providing a means of analysing vast amounts of data quickly and efficiently to provide personalized financial advice, product recommendations, and risk management strategies.

With the help of AI, financial institutions can analyse customer data such as spending patterns, credit history, investment preferences, and demographic information to gain a better understanding of their customers' financial needs. This allows for the creation of customized financial products and services that are tailored to each customer's unique financial situation.

AI has also enabled the development of more sophisticated fraud detection systems that can quickly identify and flag suspicious activity, protecting both customers and financial institutions. Additionally, AI-powered chatbots and virtual assistants can provide customers with real-time financial advice and support, enhancing their overall banking experience.

AI has enabled financial institutions to create more accurate credit scoring models. Traditional credit scoring models rely heavily on historical credit data, which can be limited in scope and may not fully capture an individual's creditworthiness. AI-powered credit scoring models, on the other hand, can analyse a wide range of data points, including social media activity and other non-traditional sources, to provide a more comprehensive assessment of an individual's creditworthiness.

AI has transformed personalized banking and has the potential to revolutionize the entire finance industry. By providing financial institutions with powerful tools to analyse data, create personalized products and services, and make informed investment decisions, AI has the potential to make financial services more accessible, efficient, and effective for everyone.

**1.1 Introduction**

In 1950, Alan Turing posed the question “Can machines think?” and since then artificial intelligence (hereafter knownas AI) applications have met with varying degrees of success.

However, in recent years there has been a resurgence of interest and AI has found innovative applications in the global financial services industry. The availability of big data, improved technology, cloud computing and faster special purpose hardware have been key drivers of the latest AI innovation wave.

AI capabilities and machine learning (ML) are boosting growth in the emerging Fintech market. Broadly speaking, the term “Fintech” describes the new technologies, services and companies that have changed financial services. It includes (but is not limited to): cryptocurrencies, blockchain, robo-advising, smart contracts, crowdfunding, mobile payments and AI platforms.

In 2017 AI topped the list as a key trend in financial services and Fintech (Future Today Institute, 2017).

The use of artificial intelligence (AI) in finance has transformed the way personalized banking is conducted. Personalized banking involves the tailoring of financial services to meet individual customer needs, and AI has made this possible by providing a means of analysing vast amounts of data quickly and efficiently to provide personalized financial advice, product recommendations, and risk management strategies.

AI has also enabled the development of more sophisticated fraud detection systems, protecting both customers and financial institutions from fraudulent activity. By analyzing vast amounts of data, AI-powered systems can quickly identify and flag suspicious activity, allowing financial institutions to act to prevent fraud.

AI has revolutionized the financial industry, and personalized banking is one of the areas that have seen significant benefits from AI technology. Be it personalized customer experiences, Fraud detection and prevention, Risk management, Chatbots, Robo-advisors and so on. Overall, AI has enabled banks to provide more personalized services, streamline processes, and reduce costs. As the technology continues to evolve, it is likely that we will see even more advanced AI applications in personalized banking.

**1.2 Functions of AI in Personalized banking**

Some of the key functions of AI in the personalization of banking include:

* **Customer segmentation:** AI can analyse customer data such as spending patterns, credit history, and demographic information to segment customers into different groups based on their financial needs and preferences. This enables financial institutions to create personalized financial products and services that are tailored to each customer segment.
* **Personalized recommendations:** AI can provide customers with personalized financial advice and product recommendations based on their unique financial situation. For example, an AI-powered system can recommend investment options that are tailored to a customer's risk tolerance and investment goals.
* **Risk management:** AI can analyse customer data to identify potential risks and provide personalized risk management strategies. For example, an AI-powered system can identify customers who are at risk of defaulting on a loan and provide them with personalized repayment plans to help them avoid default.
* **Fraud detection:** AI-powered systems can analyse vast amounts of customer data to identify potentially fraudulent activity quickly. This enables financial institutions to take action to prevent fraud and protect their customers.
* **Customer support:** AI-powered chatbots and virtual assistants can provide customers with real-time financial advice and support, enhancing their overall banking experience. These systems can answer customer queries, provide personalized recommendations, and even provide financial education and support in multiple languages.
* **Investment management:** AI-powered robo-advisors can provide individualized investment advice based on a customer's risk tolerance, investment goals, and other factors. These systems can analyse vast amounts of data to identify investment opportunities and optimize investment portfolios.

**1.3 Data and knowledge sources**

The success of personalized banking systems is heavily reliant on the availability and quality of data and knowledge sources. The following are some of the key data and knowledge sources used in personalized banking systems:

* **Customer data:** Financial institutions rely heavily on customer data to provide personalized banking services. This data includes transaction data, demographic information, credit history, investment preferences, and other relevant information that financial institutions can use to create customized financial products and services.
* **Social media data:** Social media data can provide valuable insights into customer behaviour and preferences. Financial institutions can use social media data to gain a better understanding of customer needs and create targeted marketing campaigns.
* **Economic data:** Economic data can provide insights into market trends and customer behaviour. Financial institutions can use economic data to create investment products that are tailored to current market conditions and customer preferences.
* **Financial news and research:** Financial news and research can provide valuable insights into market trends and investment opportunities. Financial institutions can use this information to provide customers with timely and relevant investment advice.
* **AI and machine learning algorithms:** AI and machine learning algorithms are used to analyse large volumes of data to identify patterns and trends. These algorithms can be used to create predictive models that can anticipate customer needs and provide personalized recommendations.
* **Regulatory data:** Regulatory data includes information on regulatory requirements, compliance standards, and legal restrictions. Financial institutions use this data to ensure that their personalized banking systems are compliant with relevant regulations and laws.

**1.4 Types**

Artificial intelligence (AI) has enabled financial institutions to provide personalized banking services at scale, catering to the unique needs and preferences of individual customers. Some of the most common types of personalized banking facilities offered by the help of AI include:

* **Personalized product recommendations:** AI-powered systems can analyse vast amounts of customer data to provide personalized product recommendations. For example, a digital bank’s AI-powered system can recommend credit cards, loans, and savings accounts that are tailored to a customer’s financial needs and preferences.
* **Personalized financial advice:** AI-powered systems can provide personalized financial advice based on a customer’s financial situation. For example, an AI-powered chatbot can provide customers with real-time advice on budgeting, saving, and investing.
* **Fraud detection and prevention:** AI-powered systems can analyse vast amounts of data to detect potentially fraudulent activity quickly. For example, an AI-powered system can identify unusual spending patterns and alert customers and financial institutions to potential fraud.
* **Risk management:** AI-powered systems can analyse customer data to identify potential risks and provide personalized risk management strategies. For example, an AI-powered system can provide customers with personalized insurance recommendations based on their unique risk profile.

In conclusion, AI has enabled financial institutions to provide personalized banking facilities at scale, catering to the unique needs and preferences of individual customers. The personalized banking facilities offered by AI are many and diverse, and the potential for AI to make financial services more accessible, efficient, and effective for everyone is significant.

**1.5 Advantages and Disadvantages**

**1.5.1 Personalized product recommendations:**

* **Advantages:**
* Sales Growth: By giving customers options for things they are likely to be interested in, personalised product recommendations can grow sales.
* Customer Service is Improved: Finding items that are pertinent to a customer's interests and requirements might help them have a better buying process overall.
* Improved Engagement: By continuously presenting clients with intriguing and relevant items, personalised suggestions may keep them interested in a website or app.
* Cost savings: By generating suggestions with AI, merchants may cut expenses by requiring less effort from their employees.
* **Disadvantages:**
* Lack of Transparency: Similar to how AI in banking might be perceived as "black boxes," it can be challenging for clients to comprehend how suggestions are made.
* Personal suggestions need access to client data, which raises the possibility of data breaches and other security risks.
* Overreliance on AI: Relying too heavily on AI-generated suggestions might result in a lack of human supervision and judgement, which may lead to mistakes or biased recommendations.
* Limited Data: Access to a vast quantity of data is necessary for personalised suggestions, and if the data is biased or limited, the recommendations may not be reliable or helpful.
* Lack of Context: AI-generated suggestions may not consider contextual elements, such as seasonal patterns, special events, or shifts in preferences, that might have an influence on a customer's purchase decisions.

**1.5.2 Personalized financial advice:**

* **Advantages:**
* Customized financial advice is tailored to the needs of the person by taking into consideration the latter's particular financial condition, objectives, and preferences.
* Better Decision Making: AI algorithms can evaluate enormous volumes of financial data to offer insights that could be hard for a human adviser to find, resulting in more well-informed choices.
* Savings: AI-generated financial advice has the potential to be more affordable than traditional financial advice, making it more accessible to those who might not have the financial means to work with a human adviser.
* Convenience: Digital platforms make AI-generated financial advice available 24/7, making it easier for customers to obtain financial advice when they need it.
* **Disadvantages:**
* Lack of Transparency: Because AI-generated financial advice might be viewed as a "black box," it can be challenging for people to comprehend how it is produced.
* Personal financial advice necessitates access to sensitive financial data, raising the possibility of data breaches and other security risks.
* Absence of Human Interaction: Some consumers may not value the human touch and personal connection that they have when dealing with a human adviser while receiving financial advice provided by AI.
* Biased Data: Financial advice produced by AI algorithms that were trained on skewed data may similarly be prejudiced, producing unjust results.

**1.5.3 Fraud detection and prevention:**

* **Advantages:**
* More Accurate Fraud Detection and Prevention: AI systems can scan enormous volumes of data in real-time to find trends and abnormalities that may signal fraud.
* Fewer False Positives: By precisely detecting fraudulent activity, AI systems may cut down on false positives, which can help financial institutions save time and money.
* Efficiency Gained: AI-powered fraud detection may automate many of the manual processes associated with the process, decreasing the need for manual inspections and enhancing the effectiveness of the fraud detection process.
* Financial institutions may save money on losses, chargebacks, and other fraud-related costs by lowering the frequency of fraud.
* **Disadvantages:**
* Data security and privacy: Because AI-powered fraud detection needs access to private financial information, there is a greater chance of data breaches and other security risks.
* Restricted Scope: New or developing fraud types that are not currently identified or included in the training data may not be able to be detected by AI algorithms.
* Restricted Context: AI algorithms may not be able to account for contextual aspects, such as changes in consumer behaviour or new fraud patterns, that might affect the chance of fraud.
* Adversarial Attacks: Fraudsters may attempt to avoid being caught by taking advantage of flaws in AI algorithms, which may result in false negatives and a higher prevalence of successful fraud.

**1.5.4 Risk management:**

* **Advantages:**
* More Accurate Risk Assessments: AI systems can scan enormous volumes of data to find patterns and trends that might point to possible problems.
* Real-Time Monitoring: AI-powered risk management is able to keep track of financial transactions in real-time, enabling quick reactions to any threats or possible hazards.
* A reduction in the requirement for human reviews and an increase in the efficiency of the risk management process are two benefits of AI-powered risk management.
* Cost savings: By lowering the likelihood of risk, financial institutions may spend less on losses, noncompliance, and other risk management-related costs.
* **Disadvantages:**
* Lack of Transparency: Similar to other financial uses of AI, risk management algorithms might be viewed as "black boxes," making it challenging to comprehend how choices are being made.
* Data security and privacy: As AI-powered risk management needs access to private financial information, there is a greater chance of data breaches and other security risks.
* Limited Applicability: AI algorithms might not be able to account for all risk variables, including non-financial elements that can influence financial decision-making.

**1.5.5 Customer support:**

* **Advantages**:
* 24/7 Availability: AI-powered customer support systems can aid clients all the time, enhancing client happiness and cutting down on wait times.
* Efficiency Gains: AI-powered customer support may automate numerous customer support-related processes, requiring less manual involvement and enhancing the effectiveness of the customer support process.
* Help that is Personalized: AI-powered customer service may leverage client information to give specific consumers customised recommendations and support.
* Cost savings: By automating customer support tasks, financial institutions may reduce costs related with customer assistance, such as personnel pay.
* **Disadvantages**:
* Lack of Personal Touch: Artificial intelligence-powered customer care may not exhibit the same degree of empathy and personal touch as human customer support agents, which may result in lower customer satisfaction.
* Low Capacity for Problem-Solving: AI algorithms might not be able to resolve intricate client issues that call for human assistance and knowledge.
* Data security and privacy: Because AI-powered customer assistance needs access to private customer information, there is a greater chance of data breaches and other security risks.
* Lack of Emotional Intelligence: AI systems might not be able to recognise and react to non-verbal cues and emotional signals, which can be crucial in customer support interactions.

**1.5.6 Investment management:**

* **Advantages**:
* Enhanced Efficiency: AI systems evaluate enormous volumes of data far more quickly than people can, which cuts down on the time needed to make investment choices.
* Increased Accuracy: Artificial intelligence (AI) systems can spot patterns and trends in data that humans would miss, resulting in more accurate investment decisions.
* Personalization: AI-powered investment management may make individualised investment recommendations based on each investor's specific risk profile and investment objectives using customer data.
* Cost Savings: AI-powered investment management can reduce the need for human investment managers, saving money on wages and other costs related to human investment management.
* **Disadvantages**:
* Limited Applicability: AI algorithms might not be able to account for all variables that may affect investing choices, such as those that aren't financial but nevertheless affect how investments perform.
* Restricted Context: AI algorithms might not be able to account for contextual elements, such as shifts in the regulatory landscape or new investment trends, that might influence investment decisions.
* Biased Data: AI systems may be taught with skewed data, which may provide biased results and treat some investments unfairly.
* Adversarial Attacks: Evil individuals may attempt to influence AI systems in order to take advantage of flaws and obtain an unfair edge when making investment choices.

**1.6 Problems with Personalized Systems**

**and Possible Solutions**

* **Problem 1**:

**Lack of confidence in AI for personalised banking is a problem.**

Lack of customer trust is one of the biggest issues with AI in finance, especially in the field of customised banking. Many individuals still find it unsettling to think that robots may make crucial financial choices on their behalf.

* **Solution:**

**Transparency and XAI (Explainable AI)**

Financial organisations may employ Explainable AI (XAI) to improve the transparency of AI and make it simpler for clients to grasp in order to solve this issue. Financial organisations can demonstrate to consumers how AI algorithms arrived at judgements thanks to XAI, giving them a better sense of control and faith in the system.

* **Problem 2:**

**Hazards to data security and privacy**

The potential of data breaches and privacy issues is still another significant obstacle for the application of AI in banking. The need for access to a lot of private and sensitive financial data when using AI in banking raises the possibility of data breaches and other security problems.

* **Solution**:

**Data governance and management are the solution.**

Financial companies might spend money on effective data governance and management procedures to solve this problem. As part of this, it's important to make sure that information is gathered, stored, and made accessible to AI algorithms in a manner that's easy for them to utilise.

* **Problem 3**:

**Bias in AI Decision Making is an Issue**

The possibility of bias in decision-making is another possible issue with AI in finance. As long as there are latent biases in the data that AI systems are educated on, the judgements they make will likewise be prejudiced.

* **Solution:**

**Ethical considerations and diverse data sets are the answer.**

Financial institutions must make sure that their data sets are varied and reflective of the people they serve in order to solve this issue. Also, they ought to take ethical factors like justice, responsibility, and openness into account when making AI decisions.

* **Problem 4:**

**Bias in AI Decision Making is an Issue**

The possibility of bias in decision-making is another possible issue with AI in finance. As long as there are latent biases in the data that AI systems are educated on, the judgements they make will likewise be prejudiced.

* **Solution:**

**Representative and diverse data sets**

Financial institutions must make sure that their data sets are varied and reflective of the people they serve in order to solve this issue. They should also take ethical factors, such as justice, responsibility, and openness, into account when making AI-related decisions.

* **Problem 5:**

**Skills Gap in AI Implementation is an Issue**

The lack of expertise in establishing and maintaining AI systems is a difficulty for AI in finance, to sum up. Many financial organisations lack the knowledge and experience needed to properly integrate and manage AI algorithms.

* **Solution:**

**Cooperation and Instruction**

Financial institutions can work with AI suppliers and outside specialists to create and implement AI solutions to solve this problem. In order to build the essential abilities and expertise inside their own businesses, they might also invest in training programmes.

* **Problem 6:**

**A lack of personalization**

Lastly, some customers could believe that artificial intelligence in finance lacks the individualised attention and relationship-building that they appreciate in traditional banking.

* **Solution:**

**Hybrid models are the answer. AI and Human Interaction Working Together**

Financial institutions can employ a hybrid strategy that combines the usage of AI with human engagement to solve this problem. Customers can, for instance, get tailored advice from an AI-powered chatbot, but if they have more complicated demands or inquiries, they can still speak to a real customer support professional. This strategy can provide clients the best of both worlds by fusing AI's effectiveness and quickness with human interaction's personalised touch.

* **Problem 7:**

**Cybersecurity Threats**

The need for access to a lot of private and sensitive financial data when using AI in banking raises the possibility of data breaches and other security problems.

* **Solution:**

**Strong cybersecurity measures is the answer.**

Financial institutions should emphasise effective cybersecurity solutions, such as encryption and firewalls, to safeguard consumer data from outside attackers in order to reduce these risks. Moreover, they must adhere to data privacy laws including the California Consumer Privacy Act and the Global Data Protection Regulation (GDPR).

**1.7 Implementation**

Now it’s time to look at some examples of how the use of AI in digital banking can be used and what benefits its adoption can bring. Below, we provide you with three possible use cases that will help you to better understand their value.

* **CASE 1:**

A person walks the street, passing by a bank. Somewhere in the 50-foot radius, the person receives notification via a mobile app, containing information about a personalized offering from the bank. What’s more, the app automatically creates a prioritized ticket to the electronic queue, so when the person comes to the bank, the first vacant specialist provides detailed information on the offering and follows up with the ongoing services.

* **CASE 2:**

A person learns about a bank through a non-banking app integrated with the banking system. Interested in the provision of services, the person easily logs into the banking app with facial recognition and immediately receives personalized offerings based on behavioural patterns gathered by the firstly used non-banking app. Because of the perfectly matching services the bank offers, the person decides to try other solutions offered by the provider. Being satisfied with the way the bank deals with its clients, the person becomes a loyal customer who trusts long-term recommendations on the financial life given by the bank.

* **CASE 3:**

A customer can interact with the chatbot via their mobile app or website to ask questions about their account balances, transactions, or other banking services. The chatbot can use natural language processing and machine learning algorithms to understand the customer's query and provide an accurate response. By using AI-powered chatbots in personalized banking, banks can improve their customer service and provide a more convenient and personalized experience for their customers. Additionally, it can help banks reduce costs by automating routine customer inquiries and providing personalized financial advice at scale.

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