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ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN BANKING

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ABSTRACT

Artificial intelligence (AI) and Machine learning (ML) are widely used in the banking industry for financial surveillance, risk management, marketing, data retention, data management, process automation, algorithmic trading and more. This paper focuses on Artificial intelligence Machine learning in Bank and the application of artificial intelligence and machine learning techniques and their role in banks. Financial institutions can mine financial transaction data generated by the proliferation of digital payments and banking to better monitor, predict, and respond to consumer behavior. The study found that banks and financial institutions are using various AI and ML services for the benefit of their customers to ensure that customers are satisfied with the services provided by banks and financial institutions. The results also suggest that customers are showing greater commitment to banking and financial services sector personnel by delivering developments and innovations to improve AI and ML practices in the workplace.

Keywords: Artificial intelligence, machine learning, bank, financial institutions, consumer satisfaction.

INTRODUCTION

AI combines computer science with robust data sets to enable problem solving and ML a subfield of AI, enables software applications to make more accurate predictions after analyzing large amounts of data, helping banks and finance Institutional risk is significantly reduced. As banks increasingly face loan defaults, credit card fraud, identity theft, and money laundering, the need to leverage AI and ML is growing exponentially. Given the speed with which new technologies are enabling banks to accelerate customer service and improve decision-making, many banks are planning to invest in AL and ML technology. According to a recent IDC report, global annual spending on AI by banks and financial companies is expected to reach \$64.03 billion by 2030. AI and ML technologies are much more effective than traditional banking systems, which are unable to perform most modern core business tasks. While traditional banking institutions are rapidly catching up with computing intelligence technology with

products such as chatbots, some fintech companies appear to be embracing AI. It plays an important role through innovation and contributes significantly to financial intelligence. These innovative technologies improve operational efficiency and reduce business risk. Perform data analysis, risk management, customer service, and credit card fraud detection quickly, efficiently and securely.

First, we need to understand what AI and ML?

Peter Sanchez, global head of banking and treasury services at Northern Trust, believes the benefit of AI lies in personalization. For individual customers, voice, facial, and fingerprint recognition can provide both ease of access and security. Collecting and analyzing her AI data of customer activity to create more accurate predictions of account balances and likely transactions, as well as suggest targeted product recommendations that meet customer needs. It can also be used for Fraud profiling uses machine learning to detect anomalous activity at the trade, fund, or company level. AI can become increasingly useful in the world of compliance by quickly scanning for regulatory changes and identifying their impact on the business landscape of websites, mobile apps, and even internal systems. "AI and machine learning are used in different ways in different areas of banking."

"There are many exciting areas in lending where AI and machine learning are increasingly being used. In credit scoring, they can be used for enhanced decision trees. This technique is gaining increasing adoption in the market, replacing traditional ML techniques such as logistic regression and tools such as SHAP (Shapley Additive Explanations) can be used to explain the decisions made by ML. The internal ratings-based approach to capital requirements for credit risk may also change. In the credit market, fraud prevention remains one of the biggest adopters of ML. However, we expect ML to continue to transform the entire lending side of banks.

For default probability models, the use of boosted decision trees and perhaps neural networks could significantly improve established models. However, the biggest change is it may occur in his operation of the IRB model. Here, with the introduction of ML techniques and model, changes can be implemented more quickly."

OBJECTIVES

1. To Explore the role of artificial intelligence and machine learning in banking.
2. To Study the financial services provided to consumers in banks.
3. To study the frauds by payment methods and their losses.

LITERATURE REVIEW

John McCarthy, the father of artificial intelligence (A.I.), aptly describes it as "the science and engineering of creating intelligent machines, especially intelligent computer programs" (Kumar & Chandrakala, 2016). Overall, it is about building an A.I. computer, or turning a computer into a robot, or working with a set of programming codes designed to enable a computer to think and act intelligently like a human. A.I. is the

process of developing intelligent computer software and systems that mimic humans by studying how humans think, how they learn, and their mental abilities when solving problems. In other words, artificial intelligence creates an intelligence quotient (I.Q.) and an emotional quotient (E.Q.) within a computer. Although AI and ML are sometimes used interchangeably, they have two different meanings.

Many people believe that machine learning is based on the premise that machines can somehow learn. And as history goes, the core tenets of machine learning, and by extension artificial intelligence, have been around for more than half a century. IBM scientist Arthur Samuel first applied machine learning in 1959 when he published a solution for his game of checkers (Arthur Samuel, 1959). He explained that for the first time in history, a computer could play checkers with a human and actually win. Over the years, programmers have developed increasingly sophisticated systems that allow machines to do things that humans can do. Another notable example is the board game Go. It has been around for over 2,500 years and was for some reason believed to be more complex and strategic than chess. Therefore, no computer can beat a human in the game of Go. Machine learning in the banking sector is accelerating changes in the way business is done. Machine learning in this field analyzes historical data and behavior to predict patterns and support decision-making processes.

ROLE OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN BANKING

Artificial intelligence (AI) and machine learning (ML) are widely used in the banking industry for financial surveillance, risk management, marketing, data retention, data management, process automation, and algorithmic trading. A recent survey of 34 large banks across various regions (US, EU, Singapore, Africa, Australia, India) found that 27 of these 34 banks have artificial intelligence such as chatbots and virtual assistants in their front office functions. It turned out that intelligence was introduced. Some of the most well-known banks in this sector across all regions include Bank of America, OCBC, ABN Amro, and YES BANK.

In the United States, all major banks are experimenting with artificial intelligence to improve their business in at least four ways. Make interactions with your customers smoother. Reduce fraud and money laundering. Improved tax reporting. Automate regulatory reporting for legal compliance.

Artificial intelligence and machine learning will be an important part of the future of finance. These help banks analyze data, predict customer behavior, and customize financial services.

APPLICATIONS OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

AI and machine learning have become an integral part of banks and other financial institutions. Considering changing values, employment, and information patterns, banks are integrating AI technology into their daily operations to provide greater convenience to their customers.

- Cybersecurity and fraud detection – The financial sector was reportedly responsible for 29% of all

cyberattacks in 2019, making it the most targeted industry. Numerous digital financial transactions occur every day, including deposits and withdrawals, paying bills, and performing transactions through online accounts and mobile apps. Improving fraud detection and cybersecurity is critical to protecting customers from potential cyber

threats. AI technology can help banks improve the security of online transactions, discover gaps in systems, and minimize risks by detecting and alerting customers and financial institutions to fraudulent activity.

- **Biometrics Authentication** – This is an important application in the banking and financial sector that determines the security of transactions. Biometric authentication processes are unique and customized, making it difficult for cyber attackers to mislead customers and extort money. This form of authentication provides enhanced security

through a strong identity verification process, providing a competitive advantage to institutions that use it.

- **Chatbots** – AI chatbots are trained on large amounts of data and use ML to intelligently generate a wide range of unscripted conversational responses to human text and voice input. By integrating chatbots into banking apps, banks can make chatbots available to customers 24/7. By understanding customer behavior, chatbots can provide personalized customer support and recommend appropriate financial services and products.

- **Track market trends** – The bank's artificial intelligence technology processes large amounts of data and helps predict the latest market trends, currencies, and stocks. Advanced machine learning techniques help assess market sentiments and suggest profitable investment options. AI can also recommend the best time to invest in stocks and alert you to potential market risks. With its high data processing power, this new technology can speed up decision-making and make transactions more convenient for both banks and their customers.

- **Data Collection and Analysis** – Banks and financial institutions record large numbers of transactions every day. Accurately collecting, structuring, and recording data can be a difficult task for employees. Innovative AI-based solutions help in efficient data collection and analysis, thereby improving the overall user experience. This information can also be used for fraud detection and credit decisions. AI also has the power to interpret past data and predict future trends. This capability, combined with machine learning technology, can create data-driven predictions, prevent capital laundering, and detect fraud.

- **Customer service** – As in other sectors, the main driver of machine learning applications in banking is consumer demand. Customers want a secure and personalized approach to banking. Machine learning and artificial intelligence improve customer service in many ways. One of them is customer support. The only way banks can secure a future with their existing customers is by providing world-class customer support. The main problems that banks face in customer service include lack of personalized approach to customer complaints, slow service, inability to resolve issues, and limited channels. All of this leads to lower customer retention rates. Banks need to respond quickly to customer inquiries. ML and AI make this possible by automating critical tasks for banks. Banks can create more accurate, cost-effective, and productive ways to address customer complaints. Chatbots and AI assistants reduce customer wait times and reduce the burden on bank staff. Some modern chatbots can perform simple tasks such as sending notifications.

- **Fraud Detection** – Machine learning is used in banking and helps in fraud detection. It is also used to prevent fraud related to credit cards and insurance. Customers only want to work with banks that offer the best cybersecurity. The UK has the highest rate of credit card fraud, with bank losses totaling £112m in 2019. Therefore, banks must make special efforts to ensure that both customers and employees are protected from fraud. The best way to prevent fraud is early detection. This gives banks enough time to block activity on affected accounts and prevent losses. Machine learning and AI are powerful tools for developing schemes that can detect and prevent fraud. Because each customer's data is unique, banks need experts who can provide practical knowledge to predict, analyze, and categorize information.
- **Risk Assessment** – ML in the banking sector reduces errors. As a result, financial companies can provide more accurate reporting. Automating credit risk assessment limits the risk of loss for both banks and customers. By examining the history, ML and AI enable more accurate forestry calculations before banks fund loan applications. In the long run, this will help banks take necessary steps to contain potential problems. Algorithms can scan large amounts of data in minutes. This is much faster than humans. Additionally, there is less chance of error. Combining this with big data allows banks to make more informed lending decisions. Banks also need to analyze investment risks. Investing in stocks is a very risky activity, so financial companies rely on successful investments to make profits. since investing in stocks is a very risky step.
- **Marketing** – Success in retail is about meeting customer needs. Any offer from the bank must address the customer's specific needs and concerns. ML in banking allows you to create personalized schemes to market your bank. A good way to identify customers for new products is data mining. Data analysis and machine learning projects require training datasets. This allows training of the algorithm. By looking at demographics, purchasing behavior, and history, data scientists can determine how likely a customer is to purchase a new product. Machine learning solutions for revenue forecasting analyze external and internal business data to create accurate demand and revenue forecasts for banking products. With bank deposit forecasting, banks are more likely to develop more personalized schemes to attract new customers. This also allows banks to improve their relationship with each customer.

FINANCIAL SERVICES PROVIDED TO THE CUSTOMERS BY BANKS

1. Cheque payments

Those who have an account with the bank will receive the check pad. Therefore, the account holder draws a check from the bank when he needs to pay money. So, after formal verification, the bank will pay the check and proceed with formal formalities.

2. Remittance of Funds

Banks help customers move funds from one place to another, such as through checks and drafts.

3. Credit Cards

A credit card is a card that allows its owner to purchase goods or services if the credit card provider pays for the goods or services immediately. The cardholder promises to repay the purchase amount to the card provider with interest after a certain period of time.

4. ATMs Services

ATMs handle banking functions such as deposits, withdrawals, and account inquiries on behalf of human bank tellers. The main advantages of ATMs are:

Available 24 Hours Reduced Labor Costs Convenient Location

5. Debit cards

Debit cards are used to withdraw money electronically from the cardholder's account. Most debit cards require a personal identification number (PIN) to confirm the transaction.

6. Home banking

Home banking is the process of completing financial transactions from your home without using a bank branch. This includes account inquiries, money transfers, bill payments, loan applications, and deposit transfers.

7. Online Banking

Banks offer online banking, allowing account holders to access their account information via the Internet. Online banking is also called "Internet banking" or "Web banking." Online banking through a traditional bank allows customers to perform all day-to-day transactions such as account transfers, balance inquiries, bill payments, and stop payment requests. You can access your account information from anywhere, day or night.

8. Mobile Banking

Mobile banking (also known as m-banking) is the term used to check balances, make payments, apply for loans, and perform other banking transactions via a mobile device such as a cell phone or personal digital assistant (PDA).

9. Accepting Deposit

Accepting deposits from depositors and account holders is the main job of banks. Banks receive deposits from people who can save money but cannot use it in profitable areas. People prefer to invest their savings in banks because they earn interest.

RESEARCH METHODOLOGY

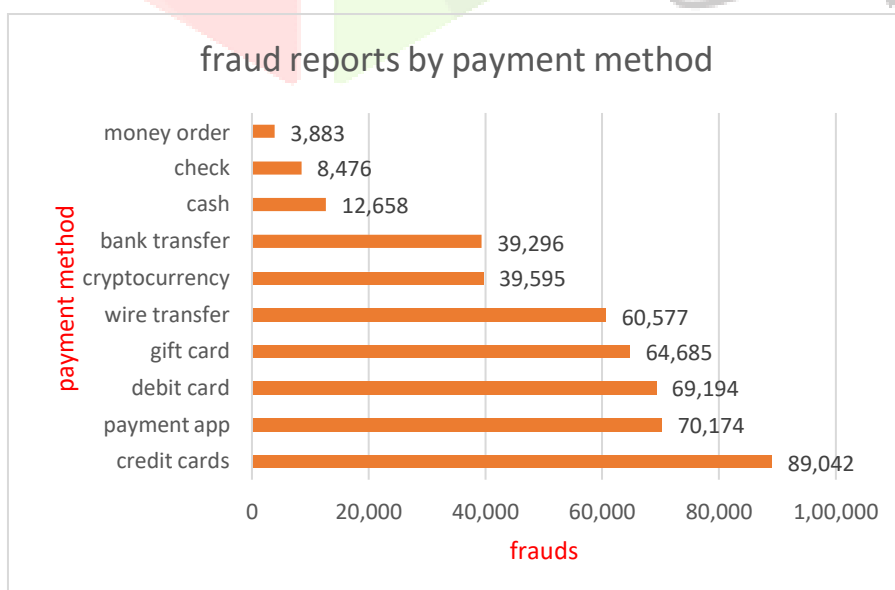
The data is collected from the secondary source of internet from the websites, Articles, journals, and other textbooks on AI and ML impact on banking industry and it is to find out the fraud reports by payment method in the year 2021. Thus various sources have been used to collect the relevant data. The analysis is mainly carried out through various statistical tools like charts and graphs. It is to identify the major frauds and the losses happened by the payment methods in the year 2021.

DATA ANALYSIS

To make an analysis on frauds by payment methods can be done by using tables and graphical representation, followed by a comparative study.

Fraud reports by payment methods (Volume, 2021)

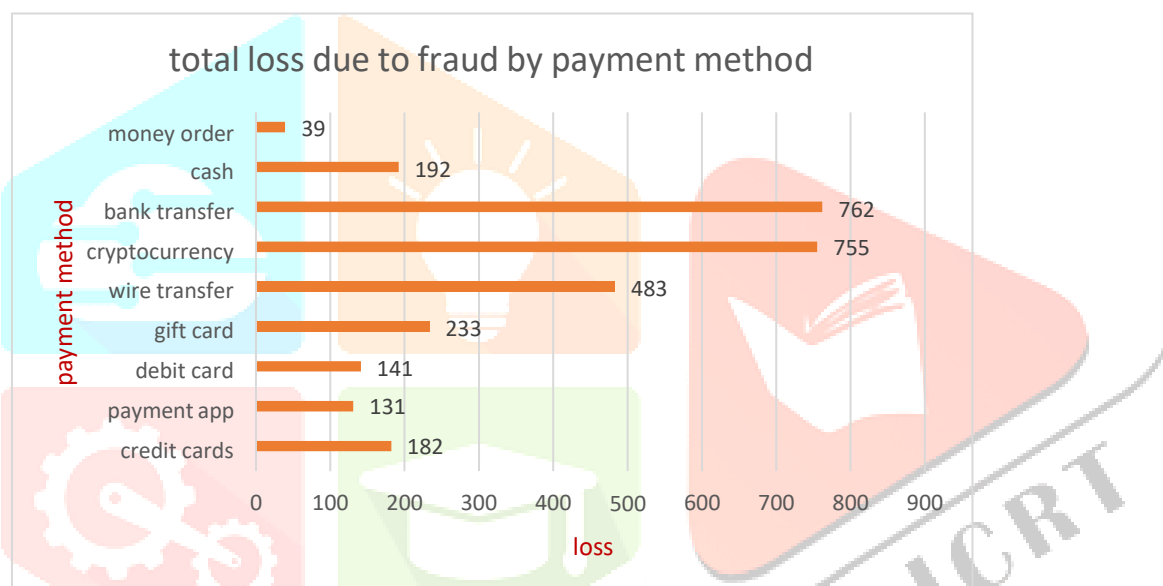
Payment method	frauds
Credit cards	89,042
Payment app	70,174
Debit card	69,194
Gift card	64,685
Wire transfer	60,577
Crypto Currency	39,595
Bank transfer	39,296
cash	12,658
check	8,476
Money order	3,883



The above graph depicts the Fraud reports by payment methods in the year 2021. The frauds due to credit cards was more when compared to other payment methods. Moreover, the frauds due to money order was less.

Total loss due to fraud by payment method (in \$ Mn, 2021)

Payment method	loss
Credit cards	182
Payment app	131
Debit card	141
Gift card	233
Wire transfer	483
cryptocurrency	755
Bank transfer	762
cash	192
Money order	39



The following chart shows total fraud losses by payment method in 2021. In this graph, banktransfer and cryptocurrency fraud have the highest losses at 762 and 755. This is because bank transfers can cause serious financial losses to individuals. Due to systemic issues with cryptocurrencies, such as the collapse of FTX, companies, financial institutions, and cryptocurrencies. The losses from money order fraud are as low as 39%.

FINDINGS

1. AI and MI help banks analyse data, predict customer behaviour, and customize financial services.
2. Customers are more satisfied with online banking, mobile banking, and other services from banks that support their investments.
3. More than 89000 (Volume) of credit card fraud incidents can occur when someone physically steals our card or virtually hacks our account, and the solution can cause serious problems.
4. Money order fraud has decreased to approximately 4000 (Volume) due to verification of authenticity of postal money orders.
5. The losses due to fraud by payment method are higher with 762 (in \$ Mn) for bank transfers and can

cause serious financial losses to individuals.

6. The overall losses from fraud by payment method were lower with 39 (in \$ Mn) for money orders because they can be easily purchased with cash and are often subject to less scrutiny than bank accounts.

CONCLUSION

AI and ML in the banking industry will contribute to more customer-centric solutions, increase customer retention, save on new customer acquisition costs, deliver significant operational efficiencies, cost savings, and provide a superior customer experience and gain a competitive advantage. Fast processing of data, automation of internal processes, and accurate forecasting help financial institutions make better decisions and benefit from the right investments. Additionally, chatbots can process customer queries faster, freeing up employees' valuable time for more important tasks and increasing productivity. Working with a business process outsourcing company allows banking institutions to integrate the latest artificial intelligence technology into their operations.

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