



Application of Artificial Intelligence in Indian Banking-Opportunities and Challenges

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ABSTRACT

Banking is the most important sector of any economy because it connects the most with government and public at large and also it protects the economy from any crises. Technology has brought tremendous change, it has made both positive and negative impact on every sector and banking sector is the most dynamic in technological transformation. Information technology is one of the most important facilitator for transformation of Indian banking industry in terms of its transactions processing as well as for various other internal systems and processes. Banks are actively adopting new age technologies for better growth prospect and ensure customer satisfaction in next generation banking.

Among the various technological transformations of last decade, the birth of Artificial intelligence is particularly remarkable. AI is fast evolving as the go-to technology for banking sectors across the world to personalize experience for individuals. With data analytics, block chain and machine learning, banks are advancing their services and offerings. The technology itself is getting better and smarter day by day, allowing more and newer banks to adopt the AI for various applications. Banking sector is becoming one of the first adopters of AI. And just like other segments, banks are exploring and implementing the technology in various ways. AI refers to computers having cognitive skills similar to humans, which could result in immense efficiency gains for banks and their clients alike. It is important to understand how AI can influence the Banking sector hence this paper is an attempt to understand the opportunities and challenges of Artificial intelligence in banking sector.

Key words: Technology, Indian Banking, Interbank, efficiency, machine learning, data analytics.

Introduction

The world has witnessed tremendous technological changes in the recent times and Artificial intelligence is one such which has brought dynamic changes in every sector. AI is the branch of computer science and it can pursues creating the computers and machines as intelligent as human beings. AI is a new technical discipline that researches and develops theories, methods, technologies, and application systems for simulating the extension and expansion of human intelligence. The objective of artificial intelligence is that machines can perform some complex tasks that require intelligent humans to complete. The machine can replace human to solve some complicated tasks.

Artificial Intelligence is an approach to make a computer, a robot, or a product to think how smart human think. AI is a study of how human brain think, learn, decide and work, when it tries to solve problems. The aim of AI is to improve computer functions which are related to human knowledge.

Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem- solving.

John McCarthy regarded as father of Artificial Intelligence defines AI as “The science and engineering of making intelligent machines, especially intelligent computer programs”.

Andreas Kaplan and Michael Haenlein define AI as a system’s ability to correctly interpret external data, to learn from such data, and to use those learning to achieve specific goals and tasks through flexible adaptation.

Artificial Intelligence is becoming more wide spread in the current market. It is used in every sector and banking sector is one of the early applied sectors as it has began to understand the need of automated decision making processes in order to reduce the margin of error. Banking sector is using AI in a very innovative way to save time and cost. The banks are using algorithms to generate an accurate result which enhances better customer services and improves sales and profit. Along with this AI ensures functional efficiencies and creates process driven operation.

Basic Concepts of Artificial Intelligence

- **Machine Learning**

First of all, machine learning is a core concept in artificial intelligence. All of us have to learn, and our human knowledge transfer is also carried out through such a method of learning. We learn the knowledge of our ancestors, and then create new knowledge by inference. We also hope that the machine has such ability: By learning the previous information, the machine is more like having intelligence and can react accordingly for new input in the future. This is called machine learning.

- **Deep Learning**

When we talk about artificial intelligence, we often hear concepts such as machine learning and deep learning. In fact, they are an inclusive relationship, and artificial intelligence includes machine learning and deep learning, and a specific form of learning in machine learning is called deep learning. It mainly based on algorithms of neural networks. At present, deep learning has made great progress in fields of image recognition, speech recognition, natural language processing, audio recognition, social network filtering, machine translation, medical image analysis, and board game programs.

- **Weak Artificial Intelligence**

What weak artificial intelligence is saying is that the machine is not really intelligent. The key is that it cannot have an autonomous consciousness. It can only have corresponding intelligence in a specific field, which is similar to a very advanced, a kind of bionics. Only in one aspect, such as watching, listening, and speaking, it appears to be intelligent, but it doesn't like humans who have complete consciousness.

- **Strong Artificial Intelligence**

Strong artificial intelligence means that the machines can appear conscious and reach or even surpass human intelligence. This is not just a field of computer science, and it involves many aspects such as psychology, philosophy, and so on. It belongs to a kind of intelligence created by people, and can even be called life.

- **Neural Networks**

When it comes to artificial intelligence, we have to mention a well-known algorithm in artificial intelligence, called neural networks. Then the neural network is the same as the neural transmission of the human brain, from one input unit to the next input unit to get a result. This is the principle of a simple neural network, which is to simulate the transmission of information from nerves in the human brain. It transfers information from one neuron to another and then passes down.

- **BP Neural Network**

After the invention of the neural network algorithm, many problems have been solved to a certain extent. At the same time, people are constantly optimizing this algorithm. First, a very widely used and very classic one is the BP neural network. BP neural network has one more hidden layer than the original neural network. There are additional hidden layers in the input layer and the output. It can greatly reduce the amount of calculation and the difficulty of calculation by way of gradient descent.

- **Convolutional Neural Network**

Convolutional neural network (CNN), which is also a kind of neural network algorithm in essence, but it optimizes the content in the BP neural network, it makes the calculation faster, and it can get the most on many problems. It improves the efficiency of its calculation by processing related information highly concurrently. At the same time, it greatly reduces the computational complexity between BP neural networks. Therefore, the convolutional neural network can currently reach the optimal solution in a fast time on many problems.

- **Image Recognition**

Image recognition is now widely used in our lives. For example, the identity of a person can be identified based on photos or when a person's face is captured with a camera. In places you can swipe an ID card; the machine collects a face image of you with a camera, and then identifies and verifies your identity. Some building access control uses image recognition for identification, and you no longer need an access card or a key. Other applications include advanced human-computer interaction, video surveillance, automatic indexing of images, and video database, among others.

- **Speech Recognition**

Speech recognition provides a faster and more convenient way for us to interact with computers. When we speak to the computer, it can know what we are talking about and interact with us. This method is completely different from what we used to type on the keyboard. This way of interacting with the computer can bring us many extended applications. Virtual assistants like Siri, Google Assistant, and Alexa can perform tasks or services for an individual based on commands or questions.

Need for application of AI in Banking Sector

- **Enhanced customer experience:** Based on past interactions, AI develops a better understanding of customers and their behavior. This enables banks to customize financial products and services by adding personalized features and intuitive interactions to deliver meaningful customer engagement and build strong relationships with its customers.
- **Prediction of future outcomes and trends:** With its power to predict future scenarios by analyzing past behaviors, AI helps banks predict future outcomes and trends. This helps banks to identify fraud, detect anti-money laundering pattern and make customer recommendations. Money launderers, through a series of actions, portray that the source of their illegal money is legal. With its power of Machine Learning and Cognition, AI identifies these hidden actions and helps save millions for banks. Similarly, AI is able to detect suspicious data patterns among humungous volumes of data to carry out fraud management. Further, with its key recommendation engines, AI studies past to predict future behavior of data points, which helps banks to successfully up-sell and cross-sell.
- **Cognitive process automation:** This feature enables automation of a variety of information-intensive, costly and error-prone banking services like claims management. This secures ROI, reduces costs and ensures accurate and quick processing of services at each step. Cognitive process automation fundamentally automates a set of tasks that improvises upon their previous iterations through constant machine learning.
- **Realistic interactive interfaces:** Chat bot identify the context and emotions in the text chat and respond to it in the most appropriate way. These cognitive machines enable banks to save not only time and improve efficiency, but also help banks to save millions of dollars as a result of cumulative cost savings.
- **Effective decision-making:** Cognitive systems that think and respond like human experts, provide optimal solutions based on available data in real-time. These systems keep a repository of expert information in its database called knowledge database. Bankers use these cognitive systems to make strategic decisions.
- **Robotic automation of processes:** AI reviews and transforms processes by applying Robotic Process Automation (RPA). This enables automation of about 80% of repetitive work processes, allowing knowledge workers to dedicate their time in value-add operations that require high level of human intervention.

Areas of application of AI in Banking

- Accounting
- Financing and Loans
- Customer services
- Fraud and cyber security
- Risk management
- Compliance
- Wealth management
- Business processing
- Merchant services
- Assets management
- Internal Auditing
- Sales
- Marketing
- Decision making
- Customers relationship management

Banks which are using Artificial Intelligence

State Bank of India (SBI): SBI is currently [using an](#) AI-based solution developed by Chapdex, the winning team from its first national hackathon, "Code for bank". On the front desk, it uses SIA chat bots, an AI-powered chat assistant developed by Payjo, a startup based in Silicon Valley and Bangalore. It addresses customer enquiries instantly and helps them with everyday banking tasks just like a bank representative.

Bank of Baroda: Bank of Baroda has [set up of](#) hi-tech digital branch equipped with advanced gadgets like artificial intelligence robot named Baroda Brainy and Digital Lab with free Wi-Fi services.

Allahabad Bank: In a media statement Allahabad bank said that its app 'EmPower' is scheduled to get major enhancements like Chat bots and artificial intelligence-based ecommerce payments.

Andhra Bank: Bangalore based AI start up, Floatbot has launched AI Chat bot integrated with Core Banking Servers of Andhra Bank, to digitally engage and automate customer support for its 5 Cr customers. Floatbot will also develop a chat bot for 20K+ internal employees of Andhra Bank to automate on boarding and training.

YES Bank: It has partnered with Gupshup, a bot platform, to launch 'YES Power' – a banking chat bot for its loan product. Another AI product **Yes Robot** is equipped to answer consumer's banking related queries anytime, anywhere, without the hassle of waiting for on- call or searching online. Also, YES BANK was the 1st Bank in India to introduce chat bot based banking with the launch of YES TAG in April 2016 which allows customers to perform banking transactions on various social messengers.

HDFC Bank: It has developed an AI-based chatbot, "Eva", built by Bengaluru-based [Senseforth AI Research](#). Eva can assimilate knowledge from thousands of sources and provide simple answers in less than 0.4 seconds. Going forward, Eva would be able to handle real banking transactions as well. HDFC is also experimenting with in-store robotic applications and launched a prototype robot IRA ("Intelligent Robotic Assistant").

ICICI Bank: It has deployed software robotics in 200+ business processes across various functions of the company, created mostly in-house using AI features such as facial and voice recognition, natural language processing, machine learning and bots among others. The software robots at ICICI Bank are configured to capture and interpret information from systems, recognize patterns and run business processes across multiple applications to execute activities. One such product is [its AI-based chatbot, named iPal](#), which helps in answering queries, helping in financial transactions and discovering new features.

Axis Bank: It [launched](#) an AI-enabled app that uses natural language processing to enable conversational banking that helps consumers with financial and non-financial transactions, queries and product information.

Canara Bank: It launched Mitra, a humanoid robot [developed](#) by Bengaluru-based Invento Robotics which helps customers [navigate](#) the bank. Another one Candi, which is slightly smaller than Mitra is supplementing the human resource.

Punjab National Bank: In 2018, the bank [announced](#) its plan to implement AI in account reconciliation as well as using [analytics](#) to improve its audit systems. The move came in after the infamous debilitating fraud of approximately INR 20K Cr, carried out by the pair of Nirav Modi and Mehul Choksi in February 2018, which almost paralysed the bank's operation for a short time.

IndusInd Bank: It has [launched](#) Alexa Skill, 'IndusAssist', using which bank account holders can conduct financial and non-financial banking transactions with Alexa, Amazon's virtual assistant.

City Union Bank: It launched the banking robot, Lakshmi. The robot can [interact](#) with customers on more than 125 subjects. Apart from answering generic questions, the robot is also programmed to connect with the core banking solution.

Literature Review

1. **Ritu Tulisameer Salunkhe(2019)-** In paper title "Role of Artificial Intelligence in providing customer service with special reference to SBI and HDFC" tried to study the application of AI in banks and how it influence customer service and also tried to understand how government is influencing application of AI by investing in it. Study also covered the challenges faced by two banks in adopting the new technology. It was found that banks are facing challenges in terms of awareness, acceptance of new technology and strong policies governing AI. The study was concluded that major challenges are yet to be explored as we are in early stage of its application but banks are putting great efforts in successful application.
2. **Dr.Simran Jewandah(2019)-** In the study title "How Artificial Intelligence is changing the banking sector- A case study of top four Indian commercial banks" tried to study importance of technological adoption in banking industry. It covers the usage of AI and its implications in banking sector. Study found that AI is used to provide personalised financial services, smart wallets, voice assisted banking, application to assist in lending decisions, customers support and digitalization. And AI has assisted in detection of frauds, reduction of cost, increase in revenue and made better customer experience. The study concluded that banks have made efforts in entering digital era through chat bot and usage of robotics software.
3. **Dr.K.Suresh Kumar, Aishwarya Lakshmi and Akalya A-** In their study title " Impact and challenges of Artificial Intelligence in Banking" tried to understand the impact and challenges in implementation of Artificial Intelligence and also benefits in Banking. They also explored the possible areas where AI can be implemented. Study also covered the initiatives taken by banks to overcome challenges and study was concluded that future of banking sector is very bright as it enable easy transaction processing and also ensures personalised and high quality customers service for better customer satisfaction.

4. **Dr.Navleen Kaur and Dr.Monika Sharma (2020)**- In their study title “ Banking 4.0-The influence of Artificial Intelligence on the banking industry and how AI is changing the face of modern day banks” tried to understand the possibilities of witnessing revolutionary changes in banking industry and also its impact on human power. They tried to evaluate the challenges faced by banks and also the benefits which customers can obtain with the application of AI in banking sector. The study concluded that effective use of AI has positive effect on customer attraction which ensures growth and development of banks.
5. **Dr.Munish Sabharwal**- In their study title “The use of Artificial Intelligence based Technological application by Indian Banks” tried to study reasons for application of AI in select Indian Banks. Study was descriptive in nature where structured interview of branch heads of 16 selected banks was done. Hypothesis was set with an assumption to prove that Indian banks do not use AI based technological application. The study was concluded that Yes Bank uses AI for employee performance evaluation, credit evaluation and portfolio analysis.

Statement of problem

Technological adoption and transformation is the need of every sector for growth and long term survival and banking sector is the most active sector in adopting the new technological innovations. Artificial intelligence is the most amazing thing which has evolved in technical world of recent and banking industry is one of the early applied sectors. Ever technology bring greater benefits and also posses the threats and same can be said about artificial intelligence, hence this study is undertaken to understand the opportunities and challenges of AI for banking sector.

Objectives

1. To understand the Artificial intelligence and its application in Indian Banking
2. To analyse the opportunities and challenges of Artificial intelligence in Indian Banking.

Scope

The study covers only the aspects of understanding Artificial intelligence and its application in Indian banking sector and also analyses the opportunities and challenges of its application.

Methodology

The study is descriptive in nature and based on secondary data. The data is obtained from journals, articles, reports of banks and news papers and internet sources.

Opportunities

- Enable self service at banks, smarter chat bot for customer service and personalised service for individuals.
- Critical and automated decision making with greater speed and accuracy and ensures error free decision making unlike human minds.
- Increases the accuracy of credit card frauds detection and anti money laundering.
- Humanoid chat bot interface can be used to increase efficiency and reduce the cost for customer satisfaction.
- Image and face recognition using real time camera images and deep learning can be used at ATM's to prevent and detect frauds and crimes.
- Capturing documents data using OCR and using machine learning to generate insight from text data greatly can bring down back office processing time.
- Suspicious behaviour, unknown calls, log analysis and spurious emails can be traced to prevent and predict security branches.
- Personalised portfolios can be managed by advisors for clients by taking in to account life style, expected return and ability to take risk on investment.
- Customized products can be offered to clients by looking at historical data, doing risk analysis and eliminating human efforts from human made models.
- Solving complex problems requires time and difficult calculation but AI performs this function without any error.
- Foundation for need of innovations in products and services which banks offer.
- Transforming customer experience and building new banking models.
- Repetitive jobs can be performed without any delay and intermission.

- Highly risky and sensitive task which human minds may not perform can be done.
- Thinks and works faster than human minds and can perform multiple task continuously without much error.
- Can be a greater tool in managing data and deriving proper output as AI does not possess any emotions like human does.
- AI machines can be deployed in hazardous environment which reduced risk for human. And AI machines are more reliable and consistent.
- AI can save time in interacting with clients digitally.
- **Challenges**
- Availability of data is the life blood of any technology and wrong data can be a serious concern in AI.
- Unavailability of people with right data skills is a biggest challenge as we are short on having large number of data scientist.
- Training to the existing employees can be very time consuming as they are new to AI technology and even employing the skilled human resource can be a great challenge.
- Data privacy regulations are not of greater significance in regulating Artificial intelligence.
- Data access and data privacy is a central aspect of any AI work and responsibility is on management to ensure privacy.
- Application of 'speech to text and text to speech' depends on natural language processing.
- Ensuring right process in collecting, validating, standardising, correcting and distributing relevant data.
- High cost of installation, repairs, up gradation, and requires huge time for recovery from any error and breakdown.
- Massive data management and ability to handle it is very crucial.
- Need of modelling techniques to estimate model parameter with high prevision using limited data sample is eminent.
- Widespread use of AI can cause ethical, moral and legal issues which can be a serious concern.
- Can create a high negative impact on traditional skills as AI brings dynamic changes in processes.

Conclusion

Technology tends to bring greater opportunities and creates challenges as well and Artificial Intelligence has brought new life in banking sector as it is creating automated processes and enhancing customer satisfaction to a greater extent. The authorities must ensure data privacy norms to protect client's credentials and also must collaborate with universities to develop data scientist. And wide network banks need to have artificial intelligence officers. AI has the potential to ensure speedy growth of banking sector.

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