

## Artificial Intelligence (AI) and Its Application on Banking Sector in India

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### ABSTRACT

Artificial Intelligence (A.I.) is a multidisciplinary field whose goal is to automate activities that presently require human intelligence. Recent successes in A.I. include computerized medical diagnosticians and systems that automatically customize hardware to particular user requirements. The major problem areas addressed in A.I. can be summarized as Perception, Manipulation, Reasoning, Communication, and Learning. Perception is concerned with building models of the physical world from sensory input (visual, audio, etc.). Manipulation is concerned with articulating appendages (e.g., mechanical arms, locomotion devices) in order to effect a desired state in the physical world. Reasoning is concerned with higher level cognitive functions such as planning, drawing inferential conclusions from a world model, diagnosing, designing, etc. Communication treats the problem understanding and conveying information through the use of language. Finally, Learning treats the problem of automatically improving system performance over time based on the system's experience. Artificial Intelligence (AI) pertains to computer programs that can execute complicated tasks that were previously limited to human capabilities, like problem-solving, reasoning, and decision-making. Today, the word "AI" refers to a broad range of technologies that enable many of the products and services we use on a daily basis, such as chat bots that offer real-time customer care and applications that suggest TV series. Artificial intelligence strengthens banking and financial institution. Because AI helps banks to process large amount of data and combat fraudulent transactions. The purpose of the paper is to study the fundamental technologies in AI and areas and application where AI technology is being used by banks and to study the opportunities and challenges of Artificial Intelligence.

**Keywords:** *Artificial Intelligence, Banking technology, Block chain, chat bots, emerging economy*

**A**rtificial Intelligence (AI) is transforming the Indian banking sector by enhancing **operational efficiency**, improving **customer experience**, and strengthening **risk management**. The market is rapidly growing, with a significant majority of financial firms actively using AI in various core operations as of **2025**. The rapid application of technologies has amplified the requirement of IT in the financial services sector, especially in banking. AI is applied in banking sector that is implemented to perceive the fraud, resolve the customer query, tracking customer behavior and approving

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personalized service to them. Nowadays banks have gone a long way from computerization to core banking platforms, CRM to Enterprise systems, and further ahead by using business intelligence solutions to dig out useful data from the internal and external sources while operating in the highly modest business environment. Maximum of the leading banks in India use business intelligence solutions especially artificial intelligence to generate new businesses and retain their esteemed customers. Further, these intelligent systems also open out substantial opportunities for banks in various features of banking business including human asset management. Although the use and adoption of AI in Indian banks is not so advanced yet, most of the banking organizations have recognized the benefits of implementation of AI while operating in the turbulent business environment. The present study aims at enlightening various ways through which banks derive benefits from the implementation of AI systems.

### ROLE OF ARTIFICIAL INTELLIGENCE USED IN BANKING INDUSTRY

AI is transforming Indian banking by enhancing efficiency, security, and customer service. Banks use AI-powered technologies like Machine Learning (ML), Natural Language Processing (NLP), and Robotic Process Automation (RPA) to automate tasks, detect fraud, and improve decision-making. AI-driven fraud detection monitors transactions in real-time, reducing financial crimes, while predictive analytics helps assess credit risk for better loan approvals. AI chat bots and virtual assistants enhance customer interactions, providing instant support and personalized financial advice. AI also streamlines KYC verification and loan processing, making banking services faster and more accessible. Personalized banking solutions, such as robot - advisors and AI-driven financial planning tools, improve user experience. Back-office automation minimizes errors and operational costs. However, challenges like data privacy, cyber security risks, regulatory compliance, and implementation costs remain. Despite these hurdles, AI's future in Indian banking is promising, with advancements in fraud prevention, financial inclusion, and block chain integration set to drive innovation and efficiency.

#### AI Applications in Indian Banking

Indian banks, including major institutions like HDFC Bank, SBI, and ICICI, are deploying AI in a wide range of applications to streamline processes and offer better services.

- **Customer Service:** Intelligent chat bots and voice assistants, such as HDFC's EVA and SBI's SIA, provide instant, 24/7 customer support, resolving queries related to account balances, transactions, and basic banking services. Generative AI (Gen AI) is also being explored for smarter customer interactions and workflow automation.
- **Fraud Detection and Security:** AI and machine learning (ML) models analyze transaction patterns in real-time to identify suspicious activities and prevent fraud before it occurs. This proactive approach enhances security and customer trust.
- **Credit Assessment and Lending:** Automated systems and AI-driven models assess borrower credibility and risk profiles using traditional and alternative data sources (like utility bills and telecom usage). This accelerates loan approvals and promotes financial inclusion for new-to-credit customers.
- **Personalization and Predictive Analytics:** Banks use AI to analyze customer data and spending habits to provide hyper-personalized financial recommendations, loan offers, investment advice, and savings strategies.

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- **Operational Efficiency:** AI automates repetitive tasks such as document processing, KYC verification, and internal support, allowing employees to focus on more complex tasks and reducing operational costs.
- **Compliance and Regulation:** AI tools help banks monitor transactions for regulatory compliance in real-time, reducing compliance costs and the risk of non-compliance.

### Key Trends and Market Overview

The BFSI (Banking, Financial Services, and Insurance) sector in India accounts for the largest portion of the country's AI market and shows the highest adoption rate.

- **High Adoption Rate:** Around **60-70%** of financial firms in India are actively using AI in production for core tasks like fraud detection and credit risk modeling.
- **Market Growth:** India's AI market is projected to grow from **\$13.05 billion** in **2025** to **\$130.63 billion** by **2032**, at an astonishing **39% CAGR**.
- **Regulatory Focus:** The Reserve Bank of India (RBI) is actively involved, having released the 'Free-AI Committee Report' in **August 2025** to recommend a sector-specific framework for the responsible and ethical use of AI models by regulated entities.

### Challenges

Despite the rapid adoption, the sector faces several challenges:

- **Data Privacy and Security:** The increased use of data raises concerns about privacy, potential breaches, and the need for robust data governance frameworks.
- **Talent Shortage:** There is a shortage of skilled AI engineers, data scientists, and domain experts required to design and maintain complex AI systems.
- **Legacy Systems:** Many older financial institutions still operate on outdated technology, making the integration of advanced AI systems complex and expensive.
- **Ethical Concerns:** Issues surrounding algorithmic bias and the need for explainable AI decisions require careful consideration and regulation to maintain fairness and public trust.

### AI is strengthening competitiveness of banks through:

- **Improve customer experience:** Banks understand customers and their behavior better with the help of AI. This enables banks to customize financial products and services by combining personalized features and seamless communication to connect customers meaningfully and build strong relationship with their customers. The use of AI improves the customer experience of the bank.
- **Forecasting of future trends and achievements:** AI help banks to predict future result and trends. AI is able to predict future scenarios by analyzing the behavior with the help of past record which help bank to identify frauds and detect anti- money laundering pattern.AI with its key recommendation studies the past to predict future behavior which helps banks to successfully up-sell and cross-sell.

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- **Automation of cognitive process:** Automating a collection of tasks that continuously learns from its past versions through machine learning is the core of cognitive process automation.
- **Authentic interactive user interfaces:** Chatbot identifies the context and an emotion of the text chat and responds to it in the most appropriate ways. This cognitive machine learning enables banks to save time and improve efficiency.
- **Effective decision making:** AI is a cognitive system that think and respond like a human expert. Along with this, it also provides optimal solutions based the available data on real time. These systems retain a repository of expert data in its database termed as knowledge database. Bankers utilize this cognitive system to make strategic decision.
- **Robotic automation of process:** AI analyses and modify processes by applying Robotic Process Automation (RPA). This makes it possible for about 80% of repetitive tasks to be automated, so that employees can focus on more important tasks that need human involvement.

### REVIEW OF LITERATURE

**Praveen Kumar Donepudi (2017).** As per the study, machine learning and artificial intelligence technologies are taking over the banking sector. Artificial intelligence and machine learning is an effective way for the sector to meet the demand of its customers for a smarter, more convenient and safer way to access their money, save, spend and invest

**Tejindra Singh and Dr. Nitin Pathak (2020).** According to the study, with the help of artificial intelligence technology, banking operation have become easy because in today's era bank is facing dilemma of whether to reduce costs or meet the expectations of customers. AI is capable of providing a necessary impetus in removing this dilemma. AI has played an important role in persuading the public to use digital channels that provide a user-friendly experience.

**Kishore Meghani (2020).** According to the result of this study, Artificial Intelligence and Block chain technology are making a big contribution to the Indian banking sector. The application of AI is leading the banking sector and also helping in meeting the demand of the customers faster and easier. It also being used to meet regulatory compliance, detect fraud and additional personal loan eligibility.

**Dr. S. Umamaheswari and Dr. A. Valarmathi, (2023).** As per the findings of the paper, AI is gradually permeating the banking sector to improve financial services. People are more inclined to use digital means to stay in communication with their bank accounts and conduct transactions during a period of social separation and quarantine. Given these advantages, it is almost a given that most employees of banks and other businesses would use AI to enhance customer service and maintain their competitiveness.

**Preeti Panwar and Samar Sherma, (2024).** The study highlights the opportunities and challenges of AI on banking industry in India. As per the study AI improve the efficiency of banking operation and enhance the customer relation. But at same time, banks have to face many challenges due to this application. To overcome the challenges, banks should improve IT governance and upgrade their IT infrastructure.

**Simran Jewandah (2018)** indicates that the banking industry can't stay away from innovation if it wants to be serious about providing individualized service to its customers. Artificial intelligence enables customized financial administrations, smart wallets,

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underwriting, voice aided banking, application to assist with loan choices, client assistance, and digitization. It discusses AI's application and recommendations for India are leading banks. Computer-based intelligence has benefited in the detection of frauds, cost reductions, and revenue growth, all of which have improved the client experience. SBI, HDFC, ICICI, and Axis Bank were noted as having evolved into the advanced period through the usage of chat bots and automated programming.

Sunil Kumar (2018) examines the growth of artificial intelligence (AI) from its inception in the late 1950s and early 1960s to the present day, as computer storage and computational capabilities have grown. Renowned scholars have highlighted concerns about existential threats, safety, the economic slump, unemployment, and other challenges. Healthcare, education, cyber security, law, finance, information surfing, transportation, virtual assistants, ecommerce, customer service, and energy were all explored as part of the international AI scenario. The researchers looked at policy documents from the United States, the United Kingdom, Japan, Singapore, and even China. The paper concluded with a discussion of AI advancements in India. TCS, IBM, and Infosys are just a few of the IT behemoths that have made important contributions to AI development. India has a wealth of knowledge.

### **Objective of the Study**

- To know about artificial intelligence's application in the banking business.
- To investigate the influence of artificial intelligence in the banking sector and how AI is changing the profile of banking
- To study the fundamental technology in Artificial Intelligence.
- To study the areas and applications where AI technology is being used by banks
- To study the opportunities and challenges regarding use of AI in banking sector

### **Methodology**

This study is descriptive in nature. The information is collected from secondary sources such as peer reviewed journals and, magazine, newspaper, official websites of bank, books.

## **FUNDAMENTAL TECHNOLOGY IN ARTIFICIAL INTELLIGENCE**

### **Machine Learning**

Machine learning is a system of data analysis. It is the branch of Artificial Intelligence which focused on developing algorithms that enable the computer system to analyze, interpret and learn from data. With the help of machine learning, the system can identify data patterns and take decision with minimum human interference. Machine Learning has wide application in different fields like, in Finance sector, Machine Learning algorithm detect fraudulent transactions and forecast stock market trends.

### **Deep Learning**

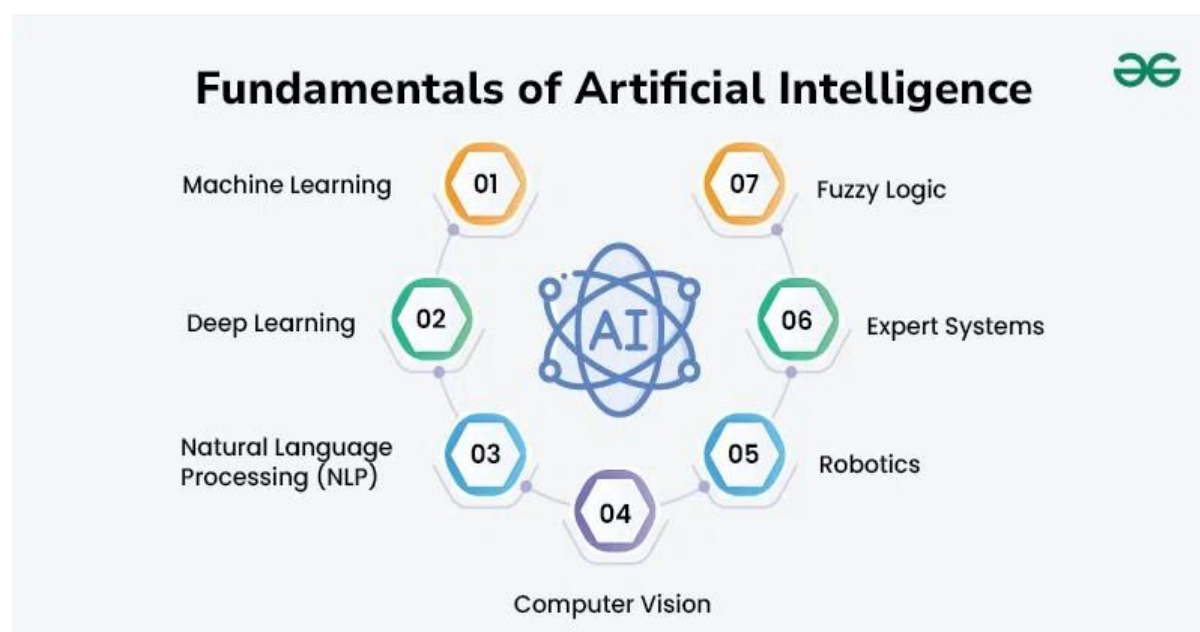
Deep Learning is a subset of machine learning that uses multi-layered neural networks. Deep learning trains computer system to perform human-like tasks, such as recognizing speech, identifying images, and making predictions.

### **Natural Language Processing (NLP)**

A subfield of artificial intelligence called natural language processing enables computers to comprehend, interpret, and modify human language. Natural Language processing enables

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human to interact and work together with machine they naturally use on a daily basis. NLP offer many benefits like, Automation of repetitive tasks, enhanced data analysis and insights, improve search and content creation.



### Robotics

In robotics, artificial intelligence (AI) enables robots to make judgments based on sensor data, learn from mistakes, and adapt to new situations. Natural language processing, computer vision, machine learning, and other AI methods may be used in this procedure. Machine learning algorithms can be utilized by robots to examine data, identify trends, and gradually enhance their performance. This is especially helpful for jobs where the surroundings are changing or uncertain.

### Expert Systems

Computer software that can solve complicated issues and make decisions similarly to a human expert is called an expert system. In response to user inquiries, it uses reasoning and inference procedures to retrieve knowledge from its knowledge store. In fuzzy logic. In 1965, Lofti Zadeh presented this idea, which was based on fuzzy set theory. This idea offers possibilities that computers cannot deliver, but that are comparable to the variety of possibilities that people can create.

## CUSTOMER EXPERIENCE POWERED BY AI AND MACHINE LEARNING AND FRAUD DETECTION

AI is transforming the clients experience in Indian banking by delivering faster resolutions, personalized services, and 24-hour assistance. Chat bots and virtual assistants powered by AI answer queries, aid with transactions, and provide personalized financial advice. Voice recognition and biometric authentication enhance security and convenience, and machine learning analyzes consumer data to make personalized product recommendations. Sentiment analysis enabled by AI helps banks better understand consumer behavior and improve customer service. AI improves banking efficiency, responsiveness, and usability by streamlining operations and providing real-time support.

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Machine learning is transforming fraud detection in Indian banking by analyzing massive quantities of transaction data to spot suspect activity in real time. AI-powered models detect irregular spending patterns, unlawful transactions, and potential cyber risks, thereby preventing financial crime. These algorithms continuously learn from new fraud trends, increasing accuracy and decreasing false positives. AI also improves Anti-Money Laundering (AML) compliance by detecting sophisticated fraudulent conduct. Automating fraud detection allows banks to improve security, reduce risks, and protect consumer assets.

### ARTIFICIAL INTELLIGENCE USED IN THE BANKING INDUSTRY

- Artificial intelligence is being used in the banking industry to scale new heights in customer relationship management. AI's transformative impact has been profound since its advent, changing how enterprises, including those in the banking and finance sector, operate and deliver services to customers. The introduction of AI in banking apps and services has made the sector more customer-centric and technologically relevant. AI-based systems are now helping banks reduce costs by increasing productivity and making decisions based on information unfathomable to a human. Also, intelligent algorithms can spot fraudulent information in a matter of seconds.
- This sector is implementing this from the ground level with a principal aim of climbing heights in customer-centric approaches. A significant part of the banking industry concerning its customers is customer relationship management, which includes communicating with them. Artificial intelligence (AI) technology is being used more and more by banks and other financial institutions for a variety of purposes, such as improving customer service through the use of virtual assistants or credit scoring to correctly determine a borrower's risk. But the battle against fraud and money laundering is one of the most significant applications of AI in banking sector.
- The entirety of AI is supported by a series of vital and interconnected technologies centered on machine learning and natural language. Importantly, AI is about more than just improved innovation. It's not about faster processing, more informational indices, or even a large number of strictly implemented rules. These advancements have produced incredible results; but they are now executing old tasks better. One of AI's main strengths is its ability to respond probabilistically to legitimate sources of input.
- The four main AI applications today are Analytics, Chat bots, Robotic Process Automation (RPA), and Report Generation, which are based on the basic breakthroughs and applied in a banking setting. The outline beneath portrays the core AI connections between fundamental advances and banking applications, all of which depend on huge measures of information, AI's back bone. The banks can hardly wait to begin on their artificial intelligence venture since they should contend in a future loaded up with creative and pattern setting innovation.
- **Drive-thru Banking Service** - If you use this service, the banking exchanges should be possible without getting out from the vehicle. There is a way where the client can share data through a window. In July 2018, Cline, an Ann Arbor-based start-up that created voice controlled AI platforms for banking sector in the year of 2015, volunteered to help with a drive-through assembly. Its conversational AI development could understand orders even if people spoke with a heavy accent or had language barriers, and it could improve the dialogue.
- **Bank Station**-Artificial intelligence can be utilized at the front, centre, and administrative centers of banks. The bank stations are a collection of self- service terminals that provide customers with a wide range of important e-administrations, such as bill payments, government e-administrations.

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- **Passbook update kiosks** – In recent years, the Indian banking sector has advanced from a people-headed to a machine-driven model. A passbook printing kiosk is a self-service machine that serving the clients. Banks named State Bank of India and BOB have done an outstanding job of introducing this feature. They have introduced self Service passbook counters, which allow consumers to print their own passbooks.
- **Cash Deposit Machines** - Cash Deposit Machines are self-aid terminals that permit you to put aside a cash deposit at any time. This help takes out the need to stand by in huge lines at banks to deposit cash. Each completed transaction generates a receipt for the customer. This machine can also be used to make payments to various accounts.
- **ATM Machine Helpline** - These aid customers in contacting their banking firm in the event of a crisis, and client services are also available at ATMs. In addition, AI has been shown in ATMs. The following are the fragments that have been offered. Machine learning in action includes AI for ATM security, machine vision ATM cameras, facial recognition for security and improved client experience, ATM machine care, and analyzing ATM cash requests.
- **Mobile Banking** - Mobile phones are becoming smarter all over the world. A major number of individuals are dedicated to mobile banking services, and that implies that versatile applications of banking appeal to them. Clients have promptly progressed to phone banking services. Having a personal attendant, regardless of whether it's Siri (Apple) or Alexa (Amazon) is delightful. Clients all across the world have praised it and expressed their delight with it.
- **Banking and Block chain Technology** - A block chain is a distributed, decentralized, and sophisticated record. It is a database of digital data that is open to the public. AI is the cerebrum or motor that enables decision making and aids in data analysis. Block chain includes encoded information, and Artificial Intelligence is the intellect that enables directing and controlling and assists in data analysis. Block chain technology is beneficial to the digital currency sector; however this is not the case. Data security, fraud prevention, and other challenges associated with computerized transactions are addressed with block chain technology

### APPLICATION OF ARTIFICIAL INTELLIGENCE IN STRATEGIC DECISION MAKING IN BANKING SECTOR

Important recent developments, such as demonetization and government reinforced efforts aimed at establishing digital India, have pushed economy in India to go cashless, but have also amassed a big amount of data in banks, needing quick, precise, and predictable record upkeep. Automation has been the backbone of modern banking since the 1990s, and the banking industry has long considered computers to be a vital part of its operations. Cash withdrawals, fund transfers, check book requests, and so on are examples. Because of critical changes in the economy, like expanded work volume, changes in purchaser inclinations, client mentalities, destinations, populace development, contenders, managerial essentials, and the need to have strong admittance to the executives and a safe financial climate for trades, the financial area has started to utilize AI to digitize the dreary labor-intensive operations. As a result, traditional branch banking has been changed into internet banking. The objective of 'Advanced India' is to change India into a carefully empowered and informed economy. Technological advancements in computing, storage, mobile phones, and widespread usage of social media are assisting and supporting this movement. 'Digital India' aims to transform India into a digitally enabled and informed economy. Organizations are heavily reliant on interconnection, computerization, machine learning, and continuing data processing in this era of change to combine actual creation/administrations with advanced innovations. This

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shift is referred to as Industry 4.0, or the fourth modern revolution. It is a perfect platform for integrating digitalized advancements, such as artificial intelligence, with banking duties, which provides Banks with significant opportunities for profit while also reducing reaction time for their customers. As a result, both customers and banks will become increasingly interested in using AI to enable more productive, rapid, and unbroken processes.

### CONCLUSION

Artificial Intelligence (AI) has shown to be an important part of future success. When judged by current banking features, AI has improved its reputation, but these features have dominated today's actual banking reality. At this time, just a few banks have begun to use AI or have adapted to new technologies. Despite the fact that AI is still in its infancy, banks are moving away from traditional banking and toward comfort banking. The banking industry can benefit from artificial intelligence in a variety of ways. Through an app, banks and financial institutions may learn about their customers' habits and provide them with personalized information and a better experience. In India, banking services are considered standard and the country is eager to embrace AI technology. To hold on aware of the competition and to remain as an innovative organization, AI has become a critical device in the banking sector.

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#### **Conflict of Interest**

The author(s) declared no conflict of interest.

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