



## USE OF ARTIFICIAL INTELLIGENCE AND BLOCKCHAIN IN BANKING SECTOR : A STUDY OF SCHEDULED COMMERCIAL BANKS IN INDIA

**Kishore Meghani\***

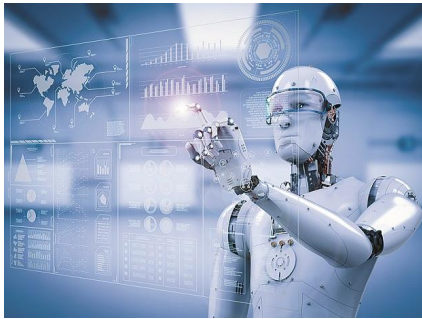
Research Scholar, M.B.A. Finance, M.A. Economics., M.Com. Accounts & Law, CBSE-UGC-NET (Commerce), NSE Academy Certified Market Professional (NCMP)-Level-Ex-Branch Head, The Nainital Bank Ltd. \*Corresponding Author

**ABSTRACT** Artificial Intelligence (AI) is rapidly transforming the global financial services industry. Artificial Intelligence studying the thought processes of human beings and it deals with representing those processes via machines (like computers, robots, etc.). on the other side The Block-chain Technology is a technology in which digital information is stored in a public shared data-base. This technology got famous mainly after introducing the first cryptocurrency which is the Bitcoin. The study was conducted to know the importance of using Artificial Intelligence and Block Chain especially in the Banks to reduce the dependency on the human element also to understand what can be the possible implications of the use of artificial intelligence and Block Chain.

**KEYWORDS :** Artificial Intelligence; Blockchain; Fintech; Banking Technology; Intelligence; Customer Service.

**"What we're seeing is something unprecedented, which is the arrival of artificial intelligence, which has a big impact ... it creates tremendous uncertainty and impacts different people differently ... and some people could be left out."**

-Robert Shiller, 2018 Davos Forum



### INTRODUCTION

The term **financial technologies** or '**Fintech**' is used to describe a variety of innovative business models and emerging technologies that have the potential to transform the financial services industry (OICO-IOSCO, 2017) [1]. In this context we look at two technologies: artificial intelligence and blockchain or distributed ledger technology to promote the financial services in India.

The term "**Artificial Intelligence**" was coined in 1956 by John McCarthy. The Oxford English Dictionary defines AI as "The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making and translation between languages." [2] and FSB (2017) defines AI as, "The theory and development of computer systems able to perform tasks that have traditionally required human intelligence." [3].

Almost a decade ago Satoshi Nakamoto, the unknown person/group behind Bitcoin, described how the blockchain technology, a distributed peer-to-peer linked-structure, could be used to solve the problem of maintaining the order of transactions and to avoid the double-spending problem (Nakamoto, 2008). [4].

**Blockchain**, "is a particular type of data structure used in some distributed ledgers which stores and transmits data in packages called 'blocks' that are connected to each other in a digital 'chain'. Blockchains employ cryptographic and algorithmic methods to record and synchronize data across a network in an immutable manner" (World Bank, 2017) [5] and Distributed Ledger Technology (DLT) is also known as blockchain technology refers to a protocol that allows peer-to-peer transfer of assets over the internet. DLT is a novel way of sharing data across multiple data stores (or ledgers) (World Bank, 2017) [5].

A **chatbot** is a technology service powered by algorithms that interacts with a customer in a natural (human-like) manner, either by voice or text.

**Robotic Process Automation (RPA)** uses a number of techniques to mimic routine human activities automatically, repeatedly, faster, and more accurately.

### Review Of Literature:

**Kaplan (2016)**, [6]. describes AI as, "The essence of AI, indeed the essence of intelligence, is the ability to make appropriate generalizations in a timely fashion based on limited data. The broader the domain of application, the quicker the conclusions are drawn with minimal information, the more intelligent the behavior."

**Malinova and Park (2016)**, [7]. examine e.g. how the securities trading and market design can be reshaped and enhanced by applying the blockchain technology.

**Pinna and Ruttberg (2016)**, [8]. claim in their study that smart contracts, which are one of the most ambitious application of the technology so far, can replace several functions that are currently maintained by necessary post-trade institutions.

**Trautman (2016)**, [9]. the blockchain technology has the potential to disrupt and reshape the world of banking, despite of all the challenges it faces.

**Chakraborty and Joseph (2017)**, [10]. each ML system comprises five components: (1) a problem, (2) data source, (3) a model, (4) an optimization algorithm and (5) validation and testing.

**Hall and Pesenti (2017)**, [11]. Identify three areas of finance in the UK where AI has great potential: personalised financial planning; fraud detection and anti-money laundering; and process automation.

**Cecchini et al. (2010)**, [12]. use SVMs for detecting corporate management fraud using financial data. The global financial system is exploring ways of using blockchain-enabled applications for financial assets, such as securities, fiat money, and derivative contracts (**Peters and Panayi, 2016** [13].; **Fanning and Centers, 2016** [14].; **Nijeholt et al., 2017** [15].; **Paech, 2017** [16]).

For example, blockchain technology offers a massive change to capital markets and a more efficient way for performing operations like:

securities and derivatives transaction (**Van de Velde et al., 2016** [17]; **Wu and Liang, 2017** [18]),

digital payments (**Papadopoulos et al., 2015** [19]; **Beck et al., 2016** [20]; **Min et al., 2016** [21]; **Yamada et al., 2017** [22]; **English and Nezhadian, 2017** [23]; **Lundqvist et al., 2017** [24]; **Gao et al., 2018** [25]),

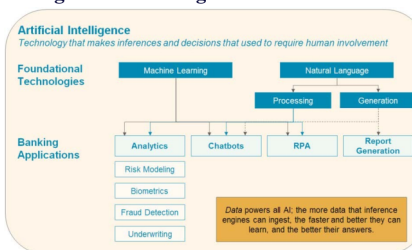
management schemes (**Gazali et al., 2017** [26]), general banking services (**Cocco et al., 2017** [27]), financial auditing (**Dai and Vasarhelyi, 2017** [28]) or cryptocurrency payment and exchange (i.e., e-wallets) (**Cawrey, 2014** [29]; **Rizzo, 2014** [30]).

Notably, a set of the world's biggest banks, including Barclays and Goldman Sachs have joined forces with R3 (R3,2015) to establish an operating blockchain-based framework for the financial market (Crosby et al., 2016 [31]).

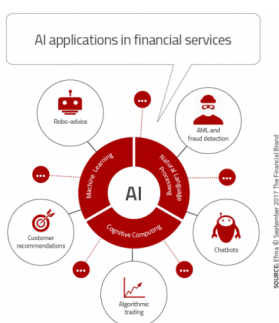
**Objective Of The Study**

- 1) To study the areas and the application where the Artificial Intelligence is being used by the banks.
- 2) To study the areas and the application where the Block Chain is being used by the banks.
- 3) To study about the applications of AI in use in the leading commercial banks in India: HDFC Bank, ICICI Bank, Axis Bank, State Bank of India, Canara Bank and City Union Bank.

**Artificial Intelligence in Banking**



**Source:** Celent analysis. Arrows represent influence of source on target



BankChain was announced on 8 February 2017 by SBI, India's largest bank. It's a 30+ member consortium led by SBI, the country's largest lender, and includes banks, NBFCs and the National Payments Corporation of India (NPCI), an organization set up by Indian banks to support retail payments. Simply put, BankChain is a community of banks for exploring, building and implementing blockchain solutions. BankChain is supported by Pune -based startup Primechain Technologies to create these solutions. Currently, it has 37 members and 8 live projects. [32].

**Applications of AI in Commercial Banks in India: HDFC Bank, ICICI Bank, Axis Bank, State Bank of India, Canara Bank and City Union Bank :**

**HDFC Bank**

India's first AI-based banking chatbot, Eva, built for HDFC Bank by Senseforth AI Research has successfully addressed over 2.7 million customer queries in a span of six months, HDFC Bank's EVA becomes India's largest banking Chatbot.[33].

HDFC bank has developed an AI- based chatbot called Eva' (Electronic Virtual Assistance), built by Bengaluru based Sense forth that has addressed over 2.7 million customer queries, interacted with over 530,000 unique users, and held 1.2 million conversations. With an accuracy level of over 85% and uptime of 99.9%. The device can provide answers in less than 0.4 seconds and has in the first few days of its launch answered more than 100,000 queries from thousands of customers from 17 countries. The bank is also experimenting with in-store robotic applications called IRA (Intelligent Robotic Assistant).[33-35].

**ICICI Bank**

ICICI bank has deployed a software robotics ( a kind of software generally focused on automating office work) in over 200 business processes a cross various functions of the company. Calling it the robotic software the bank claims it to be the first in the country and

among very few in the world to deploy this technology, that emulates human actions to automate and perform repetitive, high volume and time consuming business tasks.[35]

ICICI Bank has also launched a AI-based chatbot, named iPal( chatbot ) which has interacted with 3.1 million customers, has answered about 6 million queries, with a 90 percent accuracy rate .The bank is also considering the process of integrating iPal with existing voice assistants such as Cortana,Siri and Assistant.[36-37]

**Axis Bank**

Axis Bank recently launched an AI and NLP (Natural Language Processing) enabled app for conversational banking, to help consumers with financial and non-financial transactions, answer FAQs and get in touch with the bank for loans.[35][38].

**State Bank of India (SBI)**

SBI India's largest public-sector bank has embarked on using AI by launching a national hackathon called "Code For Bank " for developers, startups and students to come up with innovative ideas and solutions for banking sector that focusing on technologies such as predictive analytics, fintech/block chain, digital payments, IoT, AI, machine learning, BOTS and robotic process automation. SBI has also launched SIA, an AI-powered chat assistant that addresses customer enquiries instantly and helps them with everyday banking tasks just like a bank representative. [35].

SBI is currently using an AI-based solution developed by Chapdex, the winning team from its first hackathon. The solution essentially scans cameras installed in the branch and captures the facial expressions of the customers and immediately reports whether the customer is happy or sad ... this is real-time or near real-time feedback! [39].

**Canara Bank**

Canara Bank installed Mitra and Candi robots at some of its offices. Mitra, a humanoid robot developed by Bengaluru-based Invento Robotics and named after the Vedic god of friendship, could well be the poster child for cooperation in artificial intelligence (AI) between India and China. Japan's SoftBank Robotics too is in the mix with humanoid robot Candi. Mitra and Candi have found home in the Karnataka capital. Mitra greets customers in Kannada and helps them navigate the bank's head office on JC Road, while Candi offers answers in English to 215 preset questions at the financial institution's circle office on MG Road.[40].

**City Union Bank**

City Union Bank Lakshmi operates on Artificial Intelligence platform and it Provides information regarding day to day banking transactions, including interest rates. City Union Bank Lakshmi is Capable of responding to voice based interactions City Union Bank customers across the country can receive information from City Union Bank Lakshmi.[41].

"Taking cue from the robot, we introduced a ChatBot (similar to online chatting service) on our site. As more than 83 per cent of our operations take place via the online mode, we sensed the need for a Chatbot to respond to FAQs. More than 1,000 people are using this service. We intend to personalise the Chatbot to enable customers to ask account-specific information. It will be rolled out soon," N Kamakodi,CEO. [42].

**AI Applications within Banking Sector. [43].**

**Fraud Detection:** Anomaly detection can be used to increase the accuracy of credit card fraud detection and anti-money laundering.

**Customer Support and Helpdesk:** Humanoid Chatbot interfaces can be used to increase efficiency and reduce cost for customer interactions.

**Risk Management:** Tailored products can be offered to clients by looking at historical data, doing risk analysis, and eliminating human errors from hand-crafted models.

**Security:** Suspicious behaviour, logs analysis, and spurious emails can be tracked down to prevent and possibly predict security breaches.

**Digitization and automation in back-office processing:** Capturing



- internet of money. In: *New Economic Window* pp. 239–278.
- 14) Fanning, K., Centers, D.P., 2016. Blockchain and its coming impact on financial services. *J. Corporate Accounting Finance* 27 (5), 53–57.
  - 15) Nijeholt, H.L.A., Oudejans, J., Erkin, Z., 2017. DecReg: a framework for preventing double-financing using blockchain technology. In: *BCC 2017 – Proceedings of the ACM Workshop on Blockchain, Cryptocurrencies and Contracts*, co-located with ASIA CCS 2017 pp. 29–34.
  - 16) Paech, P., 2017. The governance of blockchain financial networks. *Modern Law Rev.* 80 (6), 1073–1110.
  - 17) Van de Velde, J., Scott, A., Sartorius, K., Dalton, I., Shepherd, B., Allchin, C., Dougherty, M., Ryan, P., Rennick, E., 2016. *Blockchain in capital markets—The prize and the journey.*
  - 18) Wu, T., Liang, X., 2017. Exploration and practice of inter-bank application based on blockchain. In: *ICCSE 2017–12th International Conference on Computer Science and Education* pp. 219–224.
  - 19) Papadopoulos, G., 2015. *Blockchain and Digital Payments: An Institutional Analysis of Cryptocurrencies*, 153–172.
  - 20) Beck, R., Stenum Czepluch, J., Lollike, N., Malone, S., 2016. Blockchain – The gateway to trust-free cryptographic transactions. In: *24th European Conference on Information Systems*, ECIS 2016.
  - 21) Min, X., Li, Q., Liu, L., Cui, L., 2016. A permissioned blockchain framework for supporting instant transaction and dynamic block size. In: *Trustcom/BigDataSE/ISPA, 2016 IEEE* pp. 90–96.
  - 22) Yamada, Y., Nakajima, T., Sakamoto, M., 2017. Blockchain-LI: a study on implementing activity-based micro-pricing using cryptocurrency technologies. In: *ACM International Conference Proceeding Series* 203–207.
  - 23) English, S.M., Nezhadian, E., 2017. Conditions of full disclosure: the blockchain remuneration model. In: *Proceedings – 2nd IEEE European Symposium on Security and Privacy Workshops, EuroS and PW 2017* pp. 64–67.
  - 24) Lundqvist, T., De Blanche, A., Andersson, H.R.H., 2017. Thing-to-thing electricity micro payments using blockchain technology. In: *GIoTS 2017 – Global Internet of Things Summit, Proceedings*.
  - 25) Gao, F., Zhu, L., Shen, M., Sharif, K., Wan, Z., Ren, K., 2018. A blockchain-based privacy-preserving payment mechanism for vehicle-to-grid networks. *IEEE Network*.
  - 26) Gazali, H.M., Hassan, R., Nor, R.M., Rahman, H.M.M., 2017. Re-inventing PTPTN study loan with blockchain and smart contracts. In: *ICIT 2017–8th International Conference on Information Technology, Proceedings* 751–754.
  - 27) Cocco, L., Pinna, A., Marchesi, M., 2017. Banking on blockchain: costs savings thanks to the blockchain technology. *Future Internet* 9 (3), 25.
  - 28) Dai, J., Vasarhelyi, M.A., 2017. Toward blockchain-based accounting and assurance. *J. Inf. Syst.* 31 (3), 5–21.
  - 29) Cawrey, D., 2014. 37Coins Plans Worldwide Bitcoin Access with SMS-Based Wallet, <http://www.coindesk.com/37-coins-plans-worldwide-bitcoin-access-sms-based-wallet/>
  - 30) Rizzo, P., 2014. How Kipochi Is Taking Bitcoin into Africa, <http://www.coindesk.com/kipochi-taking-bitcoin-africa/>
  - 31) Crosby, M., Pattanayak, P., Verma, S., Kalyanaraman, V., 2016. Blockchain technology: beyond bitcoin. *Appl. Innovation* 2, 6–10.
  - 32) "Impact of Information Technology in Indian Banking Industry - Banking ...." 17 May. 2018, <http://www.bankingfinance.in/impact-of-information-technology-in-indian-banking-industry.html>. Accessed 22 Dec. 2018.
  - 33) <https://cio.economicstimes.indiatimes.com/news/strategy-and-management/hdfc-banks-eva-becomes-indias-largest-banking-chatbot/60421681>
  - 34) <https://v1.hdfcbank.com/htdocs/common/eva/index.html>
  - 35) <https://www.fintechnews.org/artificial-intelligence-comes-to-the-rescue-of-banks-banks-trusting-machines-more-than-humans/>
  - 36) <https://cio.economicstimes.indiatimes.com/news/enterprise-services-and-applications/icici-banks-ai-chatbot-ipl-empowers-customers-with-information-and-financial-services/61118452>
  - 37) <https://www.icicibank.com/Personal-Banking/iplchatbot.page>
  - 38) "Artificial Intelligence comes to the rescue of banks Banks trusting machines more than humans 2018, <https://mediaindia.eu/business-politics/artificial-intelligence-comes-to-the-rescue-of-banks/>
  - 39) <https://www.ifbi.com/node/1414>
  - 40) <https://www.hindustantimes.com/india-news/meet-mitra-and-candi-robots-taking-care-of-customers-at-canara-bank-in-bengaluru/story-RFEeYogMs2nRu5dFKc7gOI.html>
  - 41) <https://www.cityunionbank.com/web-page/cub-lakshmi>
  - 42) <https://www.thehindubusinessline.com/money-and-banking/city-union-bank-sees-enough-room-for-robot-service/article9835512.ece>
  - 43) <https://www.livemint.com/AI/v0Nd6Xkv0nINDG4wQ2JOvK/Artificial-Intelligence-in-Indian-banking-Challenges-and-op.html>
  - 44) Iyer, K. V. and VV Ravi Kumar (2018) Blockchain, Bitcoin and Cryptocurrency Explained, Economic and Political Weekly, <http://www.epw.in/engage/article/blockchain-evolution-money-through-cryptocurrency>
  - 45) Casino, Fran & Dasaklis, Thomas & Patsakis, Constantinos. (2018). A systematic literature review of blockchain-based applications: Current status, classification and open issues. *Telematics and Informatics*. 10.1016/j.tele.2018.11.006.
  - 46) INSTITUTE OF INTERNATIONAL FINANCE (2016). Digitizing intelligence: AI, robots and the future of finance. (2018). Explainability in predictive modeling, Machine Learning Thematic Series Part I.
  - 47) VAN LIEBERGEN, B. (2017). "Machine Learning: A Revolution in Risk Management and Compliance?", *The CAPCO Institute Journal*, No 45.
  - 48) <https://www.edgeverve.com/blog/artificial-intelligence-financial-inclusion/>