

Implementation of Artificial Intelligence and Machine learning in Financial services

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Abstract – The recent innovations in technology is never ending and have drastically impacted everyone in every single aspect of life over the previous decades. One such innovation which is capable of changing the world is AI technology. Artificial intelligence is a computer software which can mimic and think like a human being. AI in the present day and age is being implemented in most of the business functions. One business function where AI integration is taking place at a rapid pace is the financial services industry. AI is taking over most of the core functions in finance such as risk assessment, stock trading and credit lending process to loan seekers. Implementation of AI doesn't mean that AI technology will totally take over the jobs of finance professionals but AI will help the finance managers to focus on the core and strategic aspects of the company and spend less time on monotonous and repetitive tasks. This research paper focuses on qualitative research and mainly aims to interpret how AI has been implemented in various finance functions and its influence towards employees, finance professionals and business organizations.

Key Words: Artificial intelligence, Financial services, Machine learning, Technology, Business organizations

1. INTRODUCTION

Artificial intelligence is a technical and advanced approach to make a robot, a computer or a product to learn to mimic and think like a human. Artificial intelligence in the present day is one of the most sought-after technological advancements in the fields of finance, engineering and science. The present generation is very fortunate because of the recent technological advancements that are progressing in the field of Artificial intelligence and Machine learning. A mediocre task that was once done physically is now induced by software's and automated systems [1]. According to the famous American computer scientist John McCarthy, Artificial intelligence (AI) is defined as the engineering and science of making intelligent machines. Machines in the present era are operating and performing better using cognitive intelligence which is the propensity to deal with solving problems, handle reasoning, assimilate very complex ideas and learn quickly through experience in comparison to natural level intelligence which is presented by most human beings. Artificial intelligence is being implemented in many sectors such as chatbots, self-driving cars that was introduced by Tesla motors which uses neural network and machine learning technology in its auto-pilot cars, Robotics, chatbots and image processing are some more of the core sectors where Artificial intelligence (AI) is being

implemented. Artificial intelligence will tend to play a very important role in streamlining the growth and development of the core sectors in a developing country like India. AI has transuded itself into the day to day lives of people in developed nations [2]. From, recommendation engines to Virtual reality (VR) Artificial intelligence is in our offices, the news and also our own home, for instance, Alexa and google home. There is a lot of untouched and undiscovered capability in terms of Artificial intelligence usage, particularly in humane areas. The impact of the use of AI can have a significant impact especially in under-developed and developing nations such as India, where the resources are very limited compared to other developed nations. By harnessing the power of Artificial intelligence, Non-governmental organisations (NGO) and government organisations can contribute to disentangle any lethal life problems and also promote the circumstances of local communities, especially in the developing countries. Other than the core sectors Artificial intelligence (AI) is also being implemented in many emergency responses services, education, agriculture and also medicine delivery.

2. REVIEW OF LITERATURE

2.1 Artificial Intelligence (AI)

The notion of Artificial Intelligence (AI) was first stated by the famous American computer scientist McCarthy in the year 1956. It is termed as a thinking machine which incorporates automation processing, automation theory and Cybernetics (as stated by McCarthy, 1959). Now, AI is interpreted as the capacity of a digitalized computer or computer-controlled robot to accomplish tasks which is commonly confederated with intelligent beings or human beings [3]. The concept is persistently relevant to the project of expanding systems endowed with intellectual process attribute of human beings such as the propensity to discover, learning from past experience and the ability to reason. The evolution in Artificial intelligence (AI) has come a very long way over the years, and most of the large business organizations have started to assimilate AI in their everyday business hustle. Some of the core fields where AI is being used comprehensively is finance, healthcare, manufacturing sector, Human resources (HR), accounting and law. According to the recent report by PWC, 54 percent of the executives say AI that has been executed in their businesses have already increased their productivity significantly in comparison to when they were not using AI based technologies [4]. Another, report by Forbes said that 95 percent of business executives who states they are skilled in

using big data technologies, to solve business related issues also tend to use AI technologies [5]. Based on the above statistics it is pretty evident that business organisations are emphatically taking into account AI for their business activities. Based on preceding articles and reports some of the core sectors where AI is extensively being implemented are illustrated below.

2.2 Artificial Intelligence (AI) in Finance sector

Artificial Intelligence in banking and finance sector is significantly transforming the way we as human beings associate with money. AI is extensively helping the finance sector to consolidate and optimize various processes ranging from quantitative trading, algorithmic trading, risk management process and also financial advisory services. According to Forbes business magazine 70 percent of finance companies around the globe have already started implementing AI and 60 percent of the companies are using Natural language processing (NLP).

2.3 Artificial Intelligence (AI) in healthcare sector

The health care sector is one of the most important sectors that is taking copious efforts in the enforcement of Artificial intelligence (AI). AI in health care sector will extensively make easy the lives of doctors, patients and hospital staff as well by performing various tasks which are usually done by human beings with more accuracy and less time frame. AI in health care in the present day is used in diagnosis and also to reduce error. AI is also extensively being implemented in areas such as pregnancy detection and management, treating of rare diseases and also neural networks to conduct clinical trials.

2.4 Artificial Intelligence (AI) in human resources

Business leaders and Human resource (HR) executives have a conviction that converging and implementing AI into Human resource activities such as onboarding and administration benefits will tend to improve the overall employee experience [6]. 66 percent of CEO's of top Multi-national corporations also believe implementation of cognitive computing can drive consequential value in HR and hiring processes. At present, AI has been implemented in various HR functions such as cognitive support decision making to process leave requests, hiring process and team training, to automate any repetitive and boring tasks and removing biases.

2.5 Artificial Intelligence (AI) in retail sector

As the present generation is moving towards a digital age, most of the traditional and small retailers are facing denunciation from retail giants such as Amazon, Walmart and eBay. So, even traditional retailers are investing a lot of money in Artificial Intelligence (AI) technologies. AI in the retail sector has helped customers to make their shopping experience easier and also personalizing their shopping

experience according to their tastes and preferences. According, to the recent report most retailers are going to spend around 7.2 billion in AI technology by the year 2022. The recent survey by Capgemini also stated that AI could significantly help large retailers to save up to 340 Billion US dollars by the year 2022, by facilitating efficiency and simplicity in various processes and operations [7].

From, the above reviews it is very clear that Artificial intelligence is being implemented among many different sectors. One such field is finance where AI is getting implemented at a very rapid pace. Nevertheless, there are no research-based studies done in the implementation of AI in financial services. Hence, to fulfil the existing research gap the present study by qualitative research mainly aims to bring out the various finance functions in which AI is being implemented. This research paper also tends to focus on the various benefits AI is bringing to finance companies, professionals and to study whether AI is going to replace the jobs of auditors, accountants and finance professionals.

3. RESEARCH OBJECTIVES

- 1)What are the various finance functions in which Artificial intelligence (AI) is being implemented?
- 2)How the implementation of AI in the finance industry is benefitting Finance professionals, employees and business organizations?
- 3)To what level has AI been enforced in business organizations?

4. RESEARCH METHODOLOGY

The above research is mainly focused on secondary data as there is no primary research conducted in the field of AI and the finance sector. Very comprehensive research was orchestrated to identify and pick out articles from various research databases such as Jstor, google scholar and proquest research database. Data was also collected from various grey literature sources such as websites, articles and magazines pertaining to Artificial Intelligence. The present study also incorporated an interview method with the help of a questionnaire which was mainly focused on finance professionals working in large banks and finance companies. This study also incorporated primary data collection from 117 finance professionals to understand up to what extent Artificial intelligence (AI) has been implemented in the field of accounting and Finance.

5. RESULTS AND ANALYSIS

5.1 Applications of Artificial intelligence in Finance functions

AI is taking over the financial sector by storm, most of the companies in the fin-tech sectors have started to use Artificial intelligence (AI) in order to reduce costs, save a lot of time and also add much-needed value to their products.

For instance, robot-advisors tends to track the activity of account holders by using AI technology. AI is used to analyse and comprehend how account holders invest their money, spend money from their account and make financial decisions so, the companies can personalize the advice they give their clients. Finance functions such as lending services, stock trading and financial fraud detection are some of the many functions where Artificial intelligence has been successfully implemented.

5.1.1 Lending services

Several, Micro and Macro-economic factors provide the financial institutions and innumerable factors are accountable for accompanying these financial institutions closer to risks. Lending loans is one of the key functions of Non-banking financial institutions (NBFC) and banks that propagate substantial revenue for them, but loans can't be endorsed to just anyone. In the early days, credit providing inordinately incriminated the credit scores of the customers to make lending decisions for clients and firms, Varied loan providers depend on different credit models but in the end, all their models are established on the fundamentals of the loan seekers payment details and transaction details from the past [8]. The older models tend to calculate the total credit score from limited data that is given to them by using tools such as statistical analysis, regression and decision trees. However, in the present era banks are maintaining a more comprehensive method in providing loans to customers. Banks are also taking into account data from semi-structured sources such as mobile phone usage, text message activities, social media usage and activity to enhance the rating precision of loans. These credit scoring tools in the present market that are applying machine learning (ML) algorithms to empower evaluation of even qualitative factors such as the customer's willingness to pay back the loan and consumer behaviour as well. This propensity has made way to the faster and cheaper division of borrower quality thus guaranteeing accurate credit verdict. With the implementation of AI, almost 80 per cent of the population around the world will tend to have access to credit.

Substantial access to credit is provided by the usage of Artificial intelligence. The usage of ML algorithms is not just constrained to creating an accurate, segmented evaluation of creditworthiness but also, entitled substantial and greater access to credit. In most of the conventional credit scoring models, the prospective client was required to have an adequate sum of old credit information to be considered 'scorable' [8]. In the deficiency of previous credit scoring information that particular individual often got rejected for credit as the credit score cannot be generated. But with the introduction of AI technology, lenders can now come to credit decisions by estimating the ability and willingness of the loan seeker to repay the loan. This, way many people would have access to loans from financial institutions.

A shift in the prototype of the credit lending process has been noticed in most of the banks after the implementation of AI. Over the years a lot of fintech companies are rising and helping the customers who were not able to get support from banks under traditional credit lending system. With the implementation of Artificial intelligence, banks are now able to investigate large amounts of data at a quick pace. Thus, resulting in credit policies with the capacity to handle a very broad range of credit. It also lowered the total cost of risk assessment for individuals and also significantly escalating the number of people for whom credit risk can be accurately measured.

Introduction of AI will significantly reduce the total risk of lenders. Machine learning (ML) algorithms can do what human beings usually fail to do. The best example for the above statement is meticulously identifying rogue investors that are functioning across different accounts. Machine learning usually does this by utilizing predictive analytics to large amounts of data. Implementing AI in their struggle to digitalize credit risk processes will help the banks on the nearer term gains while building key capability for overall transformation [8]. Machine learning technology is also applicable in Early-warning system (EWS) for instance bringing gaping insights at the desk from very large and devious data sets without fixing the limits of standardized statistical analysis. With the use of EWS banks and financial institutions get improvement in portfolio monitoring, automated reporting and advice for any potential actions. In relation to the SME segment, financial institutions have managed almost 70 per cent to 90 per cent enhancement in precisely forecasting any late payments six or more months before late payment.

Artificial Intelligence is also being implemented in product matching and Intelligent product selection. Even though the customer is on board, AI technology can be used before the credit check process to significantly improve the customer's overall experience [9]. Customers in the present day and age usually tend to expect personalized offers that are admissible to them. If the client chooses to agree, then the bank of their trust can recommend a pre-selection of appropriate credit products by consolidating intelligent analysis tools. The same technique can be used within application process usually when the customer of a bank applies for a credit product 'a' online their transaction data must be checked to verify their creditworthiness the incorporation of AI at this point will insert another step to the first check if another credit product may be more suitable for them. In this case, the substitute product 'b' can be automatically offered. From, the client's perspective their application has an undue advantage that they get better conditions and banks will also increase its chances of lending them money.

AI application can be very useful in the case of structured financing. But sometimes it might get complex for instance when financing is not concentrated towards the borrower but to an investment object, then special purpose vehicles

(SPV) or special purpose entities (SPE) are usually set up in the case of financing a large project. Since historical data and the previous years' balance sheet play a secondary role in Special purpose vehicles (SPV) the banks' lending decision, in this case, is based only on expected future cash flows and the corresponding propensity of service debt. This is where AI comes into action it promises more dependable predictions and also faster process time. AI technology can process a very large amount of data in a very short period and at the same time improve their algorithms. For instance, financing of large and expensive renewable energy projects such as solar panels and wind farms can be made easy with AI. Through intricate simulation of weather forecasts and the effectiveness check of these results along with the customer, documentation will make it easier for banks to make more dependable estimates on their future earnings.

5.1.2 Stock trading

An algorithm is a collection of a set of commands given to an Artificial Intelligence (AI) program to read and learn on its own or quickly respond and deliver when a certain set of events happen [10]. The recent advancement in AI is providing a very good opportunity for people that are going to benefit from them. Before the introduction of AI in trading, buying and selling of stocks and shares was a very cumbersome process but with the advent of AI, buying and selling of stocks have become a very easy process. The AI in stock trading tends to use a set of algorithms which is also called algorithmic trading. Algorithmic trading is known as a system of trading which provides decision-making transactions in the stock markets using sophisticated mathematical techniques. It uses the most advanced programming techniques to make decisions and transactions relating to buying and selling of stocks and shares. The algorithms are designed in a way that it would govern the optimum time to place an order which will cause the least amount of influence on the trade price. Interference by a human is completely eliminated and the decisions made by the algorithm is very quick and accurate. The algorithms will help to spot any huge possibilities to track profit in the market [10]. In algo-trading, computer software can decide on your sake to buy and sell stocks. Algo-trading also tends to use very advanced high- alphanumerical models that can deliver correct decisions at financial markets. Most of the companies started to enforce these technologies especially the top investment banks.

Algorithmic trading usually uses three kinds of strategies that are performance-based, statistical arbitrage and momentum investing. In performance-based strategy it is focused on execution-based plans, Investors will use this kind of strategy only when generating bulk purchases. In statistical arbitrage, it will identify cost differentials among devices, that are quoted in different markets which dispense predictable and known connections with each other. The momentum investment strategy depends on the drive in the business, it helps stock traders in the anticipation of market leaning that estimates vital action [10]. The AI in stock

trading often uses deep learning techniques to recognize different patterns in stock charts that human beings might not be able to do [11]. For instance, the common pattern that is known to stock traders is known as the ascending triangle, If the pattern indicates the share price will go up human beings will usually not be able to identify this particular pattern in a quick pace or sometimes they may not notice it at all but AI technology will recognize this pattern quickly. AI will also use past data to learn how the market reciprocated in the past events, based on the reactions they can perform in more predictive ways thus making them more reliable and accurate in the process. In recent days even National association of securities dealers automated quotation (NASDAQ) is using AI in its United states stock markets to detect any rough and potential malevolent trading activity. The newly launched proposal by NASDAQ will help to strengthen and revolutionize market inspection through machine learning and other AI capacity [12].

5.1.3 Financial fraud detection

The finance sector is on the verge of a huge transformation and the ancillary force behind it is AI. One such area that is growing tremendously is financial fraud detection, according to McAfee cybercrime related to financial fraud costs the world around 600 billion US dollars, that is equal to 0.8 per cent of the worlds Gross domestic product (GDP) [13]. Artificial Intelligence is showing to be very productive in conflicting financial frauds. According, to the recent report by Forbes magazine 80 per cent of the financial fraud detection specialists believe that AI technology will significantly help to reduce payment and financial related frauds [14]. AI's capacity to understand trend-based insights from machine learning (ML) algorithms are reducing the prevalence of payments related to fraud [14]. Artificial intelligence (AI) also uses predictive analytics and machine learning procedure to identify any incongruity in very large data sets quickly, the more data Machine learning (ML) model is fed the more authentic its predictive value. By scrutinizing historical data from a large data network, Machine learning algorithms can tend to achieve better predictability and accuracy at the same time. Big banks can also use predictive analytics-based fraud detection software to identify frauds across different domains that are involved in financial payment processing [15]. Banks can also use predictive analytics to detect any fraud in mobile applications for banking or ordering and paying for goods and services.

5.2 HOW ARTIFICIAL INTELLIGENCE IS BENEFITTING BUSINESS ORGANIZATIONS, EMPLOYEES AND FINANCE PROFESSIONALS

Artificial Intelligence (AI) plays a very consequential role in the different finance functions which have favoured not only the finance professionals but also organizations and employees too.

5.2.1 Finance professionals

Artificial intelligence (AI) is assured to change the accounting industry with changes that will abolish monotonous tasks and also free up time to prioritize any higher impact responsibilities [16]. In the recent digital era transformation, clients are digitalizing most of the processes and multiplying the number of documents and spreadsheets that accountants and audit professionals must analyse. The introduction of AI in the field of accounting and auditing will significantly help finance professionals such as auditors and accountants.

Artificial intelligence in the field of audit and accounting will help finance professionals to streamline the process of data entry and analysis. AI will help finance professionals to stay on top of the transactions amidst the system that is monotonous, time-consuming. Instead of finance data being spread over multiple PDF's, documents and spreadsheets machine learning technology will automatically classify it based on expenditure category and generates financial reports for analysis in just one place [16]. These compendious financial reports will provide business organizations with smart perception to enhance the process of financial planning. ML also extracts deeper insights as it churns data over a period of time, meaning business organizations can gain a complete view into the long-term expenditure patterns and the accounting department can contribute even greater value to business organizations by recommending clients on optimistic budget forecasting.

Artificial intelligence technology will help auditors and accountants in the process of financial fraud detection. Companies spending process has become exemplary, Employees in business organizations spend cash across different spending categories using more advanced payment means than before. As the financial data in the organization increases and broadens across supplementary payment methods the risk of non-compliance and financial fraud also increase simultaneously. According to the recent report by Certified fraud examiners (CFE) a business organization loses almost 5 per cent of its annual revenue to internal financial fraud [16] and audit professionals can normally audit only 10 per cent of the financial expenditure physically leaving most of the prospective fraud to go unnoticed. AI technology can audit hundred per cent of the financial reports by forecasting patterns and ascertaining a broad array of anomalies in the financial data. AI, in fact, can help audit professionals to catch any fraudulent spending before it even occurs.

AI technology can be used by finance professionals to extremely reduce the total time it takes to discover any non-compliance issues in the financial data. Any travel bookings, order for purchases, receipts from employees and credit-card related transactions are spontaneously scrutinized for any purchases made outside the company's policy thus helping audit professionals to quickly rectify the identified error and assist to execute corporate policies to the

employees with improved precision into corporate spending patterns. Companies can also identify which policies are functioning for the company as well as if certain policy infringements are reasonable.

5.2.2 Business organizations

AI is assured to have a huge impact on business organizations, it is no longer just about codifying business judgement and process automation but AI will be used by most of the business organizations around the world to gain deeper insights and also gain competitive advantage simultaneously. According to a recent report by Gartner, Investment in AI-based technology will be one of the companies top five priorities by 2020 [17]. A recent report by Harvard business review also says that Artificial Intelligence will add 13 trillion US dollars to the world economy over the next ten years [18].

AI helps business organizations to automate most of its customer interactions. AI is helping organizations to automate communications such as online chats, Emails, telephone calls by analysing data that was accumulated, it is also possible to program the computer software algorithms in such a way that it will precisely respond to the customers and also deal with any enquires they have [17]. For instance, AI-based chatbots can connect with unlimited customers at the same time and can both instigate communication and respond whether it is an application or a website. Approximately by the year 2020, 85 per cent of customer communications will be taken over by AI functions that can mimic and respond like human beings.

Business organizations are now able to predict future outcomes based on the process of data analysis. For instance, predictive analytics will be able to check patterns in customer data that can show if the products at the moment on sale are expected to sell and what quantity. AI can also predict when the demand for a particular product is declining. This will help the company acquire the appropriate stock and in the right quantity. AI can also predict when the demand for a particular product is declining. This will help the company acquire the appropriate stock and in the right quantity. The propensity is not just useful in the retail industry, but AI is also being used in many different areas, for instance, in the banking industry it can forecast stock price fluctuations and predict currency. In the health care sectors, it can also predict the upsurge of infections by scrutinizing social media posts.

AI will also help business organizations in the process of data unlocking. In the previous years, the amount of data business was producing is less so the data was unstructured, so it was easy to apprehend and store the data in large databases. Large business supervisors are now able to extract deeper insights from the data propagated for their business requirements. But in the present scenario, unstructured data tends to represent a larger part of the total information that is available to us [20]. 80 per cent of

the data that is produced from online websites is unstructured data. Investigating unstructured data will be the most significant factor for any business organization over the future years.

5.2.3 Employees

Nowadays most of the treasury and accounts receivable clerks strive to clear the invoice payments, when clients usually combine all the invoices in one single payment, pay the wrong amount or do not contain any invoice numbers with their payments [19]. In this, to clear the invoices the employee has to physically add the various invoices that may match up the payment amount or communicate to the customer to resolve some information. But with the introduction of AI, it would instantaneously help by proposing invoices that may match the payment amount. On the basis of experienced thresholds, the AI system will automatically help to clear any short payments by customers.

Artificial intelligence (AI) can help finance employees to conduct risk assessments. In evaluating commercial proposition for projects, finance employees are assigned with the task of estimating each project individually based on various customer attributes such as size, industry, maturity, current system landscape as well as the intricacy of the products to be implemented. To make this judgement employees of the organization often rely on finance managers who have previous experience in dealing with a similar type of project. The implementation of Artificial intelligence in this scenario will help the teams to access all the data related to the projects the company has implemented till now. Using this past data, the finance employees can map the planned project against all past projects and come up with a better decision for risk assessment.

AI helps business organizations to implement better supply chain management. As customers precedence and anticipations continue to grow, Supply chains depending on invariable legacy systems are striving to deliver the right products to its customers [20], To fulfil the constantly changing consumer demands and to also achieve global competitive advantage. Business organizations are instigating to leverage sophisticated intelligent software technology and analytics to reconstruct the way they carry on business activities. AI in supply chain management will help to inflict data-driven insights across the companies supply chain. It helps to increase the process of precision forecasting and appreciating the human perspective for innovation and strategic in-depth analysis around customer demands.

5.3 APPLICATION OF ARTIFICIAL INTELLIGENCE FUNCTIONS IN ORGANIZATIONS

The present study used a systematic interview method where questions were asked to finance professionals

working in top international finance companies to comprehend as to what level has Artificial intelligence (AI) been used in finance-related functions. The findings show that most of the finance companies have enforced AI comprehensively in the process of risk management, Stock trading and credit lending process. Accountants and audit professionals also agreed that with the application of AI the process of accounting and audit has been much simpler. Since most of the monotonous tasks are being automated the accountants and auditors can focus on other core strategic aspects of the company. Another function where AI is extensively being used in the finance industry is financial advisory services where robot-advisors are used to provide different options that are more productive compared to what their components give. With respect to the other finance functions, most of the companies are still at the test stage in India, but in countries like the USA and Canada, the other functions have already been implemented.

6. SIGNIFICANCE OF THE STUDY

Though there are many articles related to Artificial intelligence and its applications in finance there are very less research-based articles thus there is a shortage of academic-based research administered to extricate the integration of AI in financial services and its advantages. The present study which is based on qualitative research endows to the theory building of Artificial Intelligence and finance. The findings from the study disclosed the various finance functions where AI has been executed and how it made the functions more practical and organized. The study also shows the benefits that employees, finance professionals and business organizations get after implementation of AI. The findings from the study demonstrate the various reasons as to why AI has to be implemented into finance functions by all organizations.

7. CONCLUSION

No doubt AI is taking over most of the finance functions but that doesn't mean Artificial Intelligence is taking over accounting and finance jobs and completely replacing finance professionals. There is also no doubt that AI software will be able to handle most of the monotonous accounting and auditing tasks faster compared to human beings but there is always a need for human beings to interpret the data that is generated from AI technology. According to the recent report by Gartner AI is said to create more jobs than to replace them. Accountants and finance professionals need not worry in the long run about their jobs being replaced because companies will always need finance professionals to analyse the data that is generated by AI. In most cases AI technology will help finance professionals to enhance their services, AI will also streamline the accuracy for data entry, improve financial fraud detection and also helps to provide real-time data to finance professionals and in the process helps to provide better solutions to their clients. In the end, we cannot declare that AI will be able to work at a hundred per cent efficiency but it can help to reduce human-based

errors. Though they are many initial obstacles most of the finance companies are putting in a lot of effort to implement AI in finance functions because their advantages are more than their disadvantages.

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