Artificial Intelligence with Special Perspective on Finance Industry

Diva Chhabra

divachhabra2003@gmail.com

HSNC UNIVERSITY, Mumbai, Maharashtra

Abstract

Alan Turing first asked, "Can machines think?" in the 1950s, and artificial intelligence has existed ever since. Siri and Alexa on Amazon are now well-known. But the finance sector was the one that swiftly caught up with it. Technology is evolving at a rapid pace, and artificial intelligence (AI) is leading this change in the financial services sector. This rise has accelerated recently due to the development of big data, cloud computing, creative hardware, and quicker special-purpose systems. Algo trading, fraud detection, chatbots, market and regulatory compliance, market effect research, and stress testing are just a few of the many uses of artificial intelligence that are widely employed today. Financial services personnel struggle with the technology's inherent problems as well as its prospective benefits as this huge transformation takes place.

Keywords: *Artificial Intelligence, Machine Learning, Deep Learning, Neural Networks, Automation, Financial Sector, Algorithms, Chatbots, Technology, Efficiency, Processing Power, Data Quality, Analytics, Brokerage, Mortgage, Investment, Risk Mitigation, Central bank, Cost-effectiveness, Interdisciplinary, Collaboration, Integration, Erratic behavior, Portfolio management.*

Objectives

This paper has the following objectives:

1. To study in detail what artificial intelligence is all about
2. To get an overview of the advancements and types of AI
3. To analyze its effect on the economic development as a whole
4. To evaluate its application in the finance sector

Introduction

The first things that spring to mind when someone hears the word artificial intelligence are frequently robots and future settings from books and movies. But the actual world is very different. The fundamental tenet of artificial intelligence is that robots are capable of mimicking human intelligence and carrying out a vast array of activities, from easy to extremely difficult. Artificial intelligence ultimately aims to mimic human cognitive processes, including perception, thinking, and learning. Researchers and developers are making remarkably quick progress in imitating these processes, which might potentially surpass human abilities in learning and thinking on a variety of issues.

The phrase artificial intelligence (AI) is commonly used to refer to a group of machine learning-based technologies. Examples include ChatGPT and computer vision, which let computers perform activities that were previously exclusive to humans. These duties include writing content, operating a vehicle, analyzing data, determining the best route, unlocking phones with facial ID, proposing products that match our interests, making electronic payments, and more. In the modern world, artificial intelligence has many applications.

History of AI

Since the 1940s, when artificial intelligence (AI) first emerged, it has undergone an intriguing progression. As a result of the switch from decimal to binary logic, notable individuals like Alan Turing and John Von Neumann laid the groundwork for artificial intelligence (AI) during the post-World War II technological boom. John McCarthy's 1956 coining of the word "AI" at the Dartmouth Conference was a pivotal point in the development of this field. However, there were difficulties in the early days of AI, especially with regard to the small amount of machine memory available, which caused interest to wane in the 1960s.

A revival occurred in the late 1970s with the introduction of microprocessors, ushering in a golden age of expert systems such as DENDRAL and MYCIN. However, the late 1980s and early 1990s saw another decline as expert systems became labor-intensive, and cost-effective alternatives emerged. Although IBM's Deep Blue defeating chess champion Garry Kasparov in 1997 showcased the potential of AI, sustained development did not immediately follow.

The 2010s witnessed a resurgence in AI, driven by increased access to massive datasets and the efficiency of graphics card processors. Notable innovations, such as Watson winning Jeopardy in 2011 and Google's AI recognizing cats in videos in 2012, highlighted the newfound capabilities of AI. This resurgence marked a shift towards inductive learning, particularly with the rise of machine learning techniques like deep learning. Pioneering researchers like Geoffrey Hinton, Yoshua Bengio, and Yann LeCun revitalized neural networks, achieving breakthroughs in speech and image recognition. Inductive learning enabled machines to autonomously discover rules from extensive data, propelling AI to unprecedented heights.

One of the most noteworthy achievements was when AlphaGO proved the effectiveness of inductive learning by defeating human champions in the challenging game of Go. By 2020, deep learning in particular will continue to be the primary source of AI's explosive advancement. Nonetheless, there are still issues to be resolved, such as creating text comprehension systems and completely contextualized dialogues.

AI's impact on the Finance industry

The finance industry has experienced a significant impact from artificial intelligence (AI), leading to a revolution in operational processes and improved customer service for financial institutions. AI has a wide range of applications, including optimizing fraud detection and refining investment management, resulting in more efficient operations, cost reductions, and increased customer satisfaction. Nowadays, companies are incorporating AI-driven applications into their daily operations. According to a 2021 research

report by Savanta and Oracle titled "Money and Machines," 85% of business leaders aim to automate their manual processes to enhance customer satisfaction and streamline their operations. AI plays a crucial role in predicting market trends and assisting financial institutions in making data-driven decisions to stay ahead of the competition. One significant breakthrough in the field of AI is the introduction of Machine Learning, which focuses on developing algorithms capable of learning and improving through experience. Traditional fraud detection methods rely on rigid rules-based systems, where suspicious transactions are identified based on predefined criteria. However, these systems often lack flexibility, require frequent updates, and can result in false positives. In contrast, machine learning offers a superior approach by swiftly and accurately analyzing data. By identifying patterns and anomalies, machine learning has the ability to predict potentially fraudulent activities.

As AI continues to gain prominence in the finance industry, ethical concerns are also on the rise. Three major worries stand out: privacy, fairness, and the balance between AI and human judgment in decision-making. Privacy concerns arise from the constant surveillance associated with AI, making people feel uneasy. Fairness is crucial to ensure that AI treats everyone justly. Additionally, finding the right balance between AI and human judgment is essential in decision-making processes. AI systems can create significant issues in finance if ethical considerations are not given sufficient attention. To address these concerns, it is crucial to examine existing rules and establish a system that ensures the ethical use of AI in finance.

AI has made tremendous strides in its adoption in finance businesses. Fintech companies are leveraging AI tools in diverse areas ranging from creditworthiness assessment in lending to fraud detection, customer service optimization, and personalized investing recommendations. A few examples include Upstart's utilization of AI and machine learning algorithms to improve their creditworthiness assessment, increasing adoption of AI tools by IBM and other startups for preventing fraud, and Lemonade's AI-driven customer service. As AI continues to permeate the financial industry, its transformative impact on operational efficiency and customer service is evident, marking the beginning of a new era in financial technology.

Significance of AI

Automation: This is one of the most common benefits of artificial intelligence and has had a huge influence on various industries such as consumer products, transportation, communications, and service industry. Automation helps in decreasing the time taken by an individual to do a task on his own, which leads to an increase in productivity. In addition, it also aids these sectors to make more efficient utilization of raw materials, improve the quality of products, and establish safety standards.

Reduction in Human Error: A major advantage of Artificial Intelligence lies in its capacity to markedly diminish errors while enhancing accuracy and precision. AI decisions are guided by pre-collected information and specific algorithms, and when programmed effectively, errors can be virtually eliminated. For example, A compelling instance of mitigating human error through AI is evident in the utilization of robotic surgery systems. These systems execute intricate procedures with exceptional precision, minimizing the likelihood of human error and elevating patient safety standards in healthcare.

24/7 Availability: Whereas humans can't work or stay productive 24/7, AI can work endlessly without any interruption.AI can not only think faster, and provide various alternative suggestions or solutions but it can do so with accurate results because of its algorithms. Online customer support chatbots offer immediate assistance to customers regardless of time or location. Powered by AI and natural language processing, these chatbots adeptly handle common queries, resolve issues, and, when necessary, escalate more complex problems to human agents. This ensures continuous and smooth customer service 24/7.

Unbiased Decisions: An advantage of using AI is its impartiality in providing information, that is solely based on facts and real-time information. This helps in providing more reliable data that leads to efficient decision-making. Whereas in the case of humans, personal biases and opinions are likely to get in the way of the factual data expected. For instance, a decision to hire an individual

may be influenced by religion, demography, etc but in the case of AI-powered recruitment systems these biases are avoided and importance is given to skills and qualifications.

Perform Repetitive Jobs: We usually get many monotonous tasks such as mailing thank you notes, conducting a check on any errors in a document, etc. Artificial Intelligence can be used to automate such tasks, which would help humans get more time to be creative and lead to effective utilization of time. One illustration of this concept involves the integration of robots within manufacturing assembly lines. These robots excel at executing repetitive tasks like welding, painting, and packaging with exceptional precision and speed. This not only diminishes operational costs but also enhances overall efficiency, showcasing the transformative impact of automation on industrial processes.

Daily Applications: AI is used in our day-to-day life without even realizing it. Ever wondered how is weather forecast available? Or how Google Maps function? This is all linked to artificial intelligence algorithms. With the help of a chatbot we can get a personalized answer to any question we ask like a 10-day strategy for this business, how can we promote our products, etc and we would get a detailed step-by-step answer for it.

Medical Applications: AI has played a pivotal role in advancing the field of medicine, contributing significantly across various domains, including diagnosis, treatment, drug discovery, and clinical trials. With the help of AI-powered tools, one can identify health risks, analyze extensive data, and formulate personalized treatment strategies. This not only enhances patient outcomes but also expedites the progress of innovative medical treatments and technologies, underscoring the profound impact of AI in the realm of healthcare.

Drawbacks of AI

1. High Expenses

Developing a machine capable of emulating human intelligence is a significant undertaking that demands substantial time and resources, often resulting in exorbitant costs. Additionally, to remain up-to-date and meet the latest requirements, AI systems must operate on cutting-edge hardware and software, further contributing to their considerable expense.

2. Lack of Innovation

One notable drawback of AI is its inability to think creatively or outside the confines of pre-fed data and past experiences. While AI can learn and generate content based on provided information, it lacks the capacity for originality. For instance, the bot Quill can produce Forbes earning reports, but these articles lack the unique human touch found in other Forbes publications.

3. Impact on Employment

Artificial intelligence, particularly in the form of robots, has the potential to displace certain occupations and contribute to increased unemployment in some cases. This has led to concerns about chatbots and robots replacing human workers. However, it is important to note that this is not always the case, as the implementation of robots can also create new job opportunities while enhancing overall efficiency.

4. Encouraging Laziness

AI applications automate numerous mundane and repetitive tasks, reducing the need for human cognitive effort. As a result, individuals may rely less on their own mental faculties, potentially leading to a decline in critical thinking and problem-solving skills. This overreliance on AI can pose challenges for future generations.

5. Ethical Considerations

Incorporating ethics and morality into AI systems can be a complex endeavor. The rapid advancement of AI has sparked concerns that, at some point, AI may become uncontrollable and pose a threat to humanity. This hypothetical scenario, known as the AI singularity, highlights the importance of addressing ethical implications in AI development.

6. Devoid of Emotion

From a young age, we have been educated that computers and other machines lack emotions. Human beings operate as a collective, and effective team management is crucial for achieving objectives. Nevertheless, it is undeniable that robots surpass humans in terms of efficiency, yet it remains true that the human connections that underpin teams cannot be substituted by computers.

7. No Progress

Humans are incapable of creating artificial intelligence as it relies on pre-programmed facts and experiences. AI excels at performing repetitive tasks, but if any adjustments or enhancements are desired, manual alteration of the codes is necessary. AI cannot be accessed and utilized in the same manner as human intelligence, although it has the capacity to store infinite data. Machines can only accomplish tasks for which they have been developed or programmed; when asked to perform anything else, they often fail or produce futile outcomes, which can have significant adverse consequences. Consequently, we are unable to achieve anything conventional.

Overall Effect of AI

Types of AI can broadly be categorized into two categories:

Based on Capabilities- Narrow AI, Super AI, and General AI

Based on functionalities- Reactive Machine, Limited Memory, Theory of Mind, and Self Awareness

Different types of AI are used in different industries and have impacted employment in a substantial way.

India's job market has experienced a significant change since the popularity of AI. The introduction of Open AI has played a pivotal role in automating routine tasks and increasing efficiency while also hindering employment opportunities in areas like call centers and data entry. AI has brought tremendous opportunities in certain sectors of the economy such as data science, engineering, and machine learning. AI has undeniably made its mark across diverse sectors in India, ranging from healthcare diagnostics to e-commerce recommendation engines. The finance industry is leveraging AI for robust fraud detection, while agriculture benefits from predictive models that forecast crop yields. Notably, startups in Bengaluru and Hyderabad are at the forefront of pioneering innovations, propelling India's AI ecosystem into the future. The surge in investments in AI-driven companies reflects strong industry confidence. AI, as a transformative technology, doesn't simply replace jobs but rather gives rise to new and innovative roles. The introduction of AI has created positions such as AI Ethics Officer, Chatbot Content Creator, and AI-driven User Experience Designer. Leveraging its strong IT foundation, India has positioned itself as a hub for these cutting-edge roles in the evolving landscape of technology and artificial intelligence.

Finance Business

In the current financial services industry, financial institutions are established with the purpose of offering a diverse range of deposit, lending, and investment products to individuals, businesses, or both. While certain financial institutions concentrate on providing

services and accounts to the general public, others tend to cater exclusively to specific consumers by offering more specialized options. In a capitalist economic system, financial institutions play a crucial role in overseeing the economy, promoting equitable financial practices, and fostering economic growth

Central banks play a crucial role in the financial sector as they are entrusted with the task of overseeing and controlling all other banks. In the United States, the Federal Reserve Bank (Fed) serves as the central bank, responsible for implementing monetary policies and ensuring the proper functioning of financial institutions through supervision and regulation. Ordinary consumers do not have direct interaction with central banks. Instead, it is the major financial institutions that directly collaborate with the Fed to offer various products and services to the general public.

Historically, **retail banks** primarily provided products and services to individual consumers, whereas commercial banks focused on serving businesses directly. However, in the present day, the majority of major banks extend their offerings to encompass deposit accounts, loans, and restricted financial guidance for both individual consumers and businesses. Retail and commercial banks provide a range of products to their customers, including checking and savings accounts, certificates of deposit (CDs), personal and mortgage loans, credit cards, and business banking accounts. On the other hand, internet banks offer the same array of products and services as traditional banks, but they operate exclusively through online platforms rather than physical branches. This allows customers to conveniently access banking services through their computers, mobile devices, ATMs, or customer service hotlines. Additionally, internet banks provide the convenience of depositing checks into your account by simply taking a picture of the check using your phone and the bank's app.

Credit unions are financial institutions that operate as nonprofit organizations and offer traditional banking services. These institutions are established, owned, and managed by their members. In the past, credit unions used to cater to a specific demographic group, known as the field of membership.

Investment banks play a crucial role in the financial industry by serving as intermediaries in intricate transactions. These transactions can range from assisting startups in their initial public offerings (IPOs) to facilitating mergers between companies. Additionally, investment banks can act as brokers or financial advisors for esteemed institutional clients like pension funds.

Brokerage firms play a crucial role in facilitating the buying and selling of securities for both individuals and institutions. These firms provide a platform for customers to execute trades involving stocks, bonds, mutual funds, exchange-traded funds (ETFs), and even certain alternative investments.

Insurance companies are financial institutions that assist individuals and businesses in mitigating the risk of potential losses. They offer protection against various unfortunate events such as death, disability, accidents, property damage, and more. Additionally, insurance companies may collaborate with banks to provide insurance products to their customers.

Mortgage companies are financial institutions that have expertise in originating or funding mortgage loans. The primary focus of mortgage companies is to originate loans and secure funding from financial institutions that supply the necessary capital for these mortgages. In today's landscape, many mortgage companies operate through online platforms or have a limited number of physical branch locations. This approach enables them to offer mortgages at reduced costs and fees.

Growth of the Finance sector

The financial sector in India is currently experiencing a growth rate of approximately 8.5% per annum. This increase in growth rate directly contributes to the overall growth of our economy. In recent years, there have been significant reforms in monetary and economic policies, as well as the opening up of financial markets and the development of various other financial sectors. As a result,

consumers now have access to a wide range of financial products and services, ensuring their satisfaction. The Reserve Bank of India has also played a crucial role in facilitating the growth of the financial sector in India.

The transformation of the Indian financial landscape is being driven by innovation and technology, as evidenced by the adoption of India Stack, artificial intelligence (AI), embedded finance, and robotics. Traditional lenders are reassessing their role and forming partnerships with fintech companies to provide customized loans, savings options, insurance, and various credit products.

AI in Finance Business

Applications of AI in Finance

AI has significantly transformed the way work is conducted within organizations, including the finance sector. By leveraging technology, routine tasks have been streamlined, eliminating the need for manual reviews and reducing the risks associated with inaccurate data. The benefits of AI in finance are extensive, ranging from seamless customer interactions and reduced human errors to cost savings, task automation, fraud detection, and personalized recommendations. The industry has truly embraced the advantages that AI brings.

Lending

Retail lending operations can be streamlined and made more efficient through the use of document capture technologies. Instead of manually reviewing pay slips, invoices, and other financial documents, financial institutions can rely on AI algorithms to automate the process. These algorithms can accurately capture document data and handle lending operations with minimal human intervention. By embracing this technology, banks and financial institutions can expedite the credit application process and reduce the likelihood of errors.

Commercial Lending Operations: Likewise, suitable data can be captured by financial organizations via cash flow statements and other financial documents of the borrower companies. The extracted data allows banks to offer speedy services for their lending operations, while also enabling more accurate handling of credit evaluation.

Retail credit scoring can be enhanced through the use of AI technology, enabling financial companies to efficiently and accurately assess credit applications. AI tools utilize predictive models to analyze the credit scores of applicants, resulting in reduced regulatory costs and improved decision-making capabilities.

Commercial credit scoring involves the utilization of AI and data analysis to assess relevant financial information. By leveraging techniques like machine learning, valuable insights can be provided without the need for manual calculations using spreadsheets or financial documents. This streamlined approach ensures that no crucial details are overlooked, leading to more informed commercial loan decisions.

Investments

Robo-Advisory

Robo-advisory services utilize virtual assistants and AI chatbots to monitor personal finances. These assistants can provide valuable insights by analyzing spending patterns and target savings. In addition to offering advice on managing portfolios, robo-advisors can also suggest personalized investment portfolios that include bonds, shares, and other assets. To provide tailored recommendations, robo-advisors take into account customer information such as risk appetite and investment experience.

Operations

Debt Collection

AI is utilized by banks and other financial institutions to address the problem of delinquency and provide an effective and streamlined process for debt collection. TrueAccord, founded in 2013 in San Francisco, is an example of AI in debt collection. This platform offers AI-powered debt collection solutions to banks, eCommerce, and telecom companies. TrueAccord asserts that its decision engine employs machine learning to create customized digital interactive experiences for each debtor.

Procure to Pay

Financial institutions can implement AI-powered invoice capture technology to automate their invoice systems and offer convenient billing services to remind customers to make payments. This will enable businesses to streamline their processes, reduce manual errors and costs, and improve loan recovery rates.

Account reconciliation

Account reconciliation in commercial banking can be enhanced through the adoption of AI. By utilizing AI, companies can extract data from bank statements and compare it using complex spreadsheets. This technology enables the account reconciliation process to be significantly accelerated and eliminates any errors that may impede the process.

Insurance

Insurance Pricing

AI has the ability to evaluate consumers' risk profiles and determine the most suitable insurance plan prices, just like credit applications. This results in cost reduction, streamlining of business operations, and enhanced customer satisfaction.

Claims Processing

Claim processing involves various tasks such as reviewing, adjusting, investigating, and remitting claims. With the help of AI, these tasks can be efficiently managed as AI technology can handle a large volume of documents required for claims processing. Additionally, AI can also detect fraudulent claims and ensure that the claims comply with regulations. For example, Tractable has developed an AI system that can identify accident images and estimate repair costs. This platform claims that insurance companies can speed up their claims processing by ten times using this technology. Another instance of AI in the insurance industry is Cape Analytics, a computer vision startup that transforms geospatial data into actionable insights. This helps insurers create better policies and provide homeowners with appropriate solutions to protect their properties from wildfire damage. By utilizing AI, Cape Analytics generates detailed information about the proximity of surrounding structures, vegetation density, roof materials, and the calculated risk. Homeowners can then use this data to take preventive measures.

Customer Service

Understanding Your Customers (KYC) Procedures

By incorporating AI technologies like NLP, banks can now identify any unusual patterns and identify areas of risk in their KYC procedures without the need for human intervention.

Responding to customer requests

Customer requests can be efficiently handled by Conversational AI systems, minimizing the need for human intervention unless the issue cannot be resolved. This advanced system comprehends and provides assistance for approximately 75% of consumer queries, resulting in a significant reduction of no-show appointments by around 10% with the sales team.

Identification of upsell & cross-sell opportunities

Identification of opportunities for upselling and cross-selling can be achieved by banks and other financial institutions through the use of AI technologies and CRM systems. This enables them to not only increase their revenues but also enhance customer satisfaction. For example, a platform can recommend car insurance to a customer who is in the process of purchasing a car.

Customer Churn Prediction

AI models have the ability to analyze consumer behaviors and predict which customers are more likely to churn in the future. By understanding these patterns, financial institutions can identify the reasons why a customer is at risk and take necessary measures to prevent churn.

Future Scope of AI in Finance

Because of its prominent position in information processing within financial markets, the finance industry provides a clear testing ground for investigating the possible effects of AI. It is not unexpected that financial institutions from a variety of industries make significant investments in data and technology to stay competitive.

First of all, it's clear that artificial intelligence (AI) has the capacity to drastically alter a number of different businesses. Consider the asset management sector as an illustration. We have seen two major upheavals in the last 15 years, both of which are related to the growing power of data and technology. The first upheaval concerns the mutual fund sector, where we have seen the rise of passive fund managers—investing in indexes without doing any analysis—while active fund managers—picking individual stocks—have become less and less influential. Advances in data and technology have made passive investing more competitive and presented hurdles for active managers seeking to obtain informational advantages, which has caused this change to occur astonishingly quickly.

In addition, the rise in popularity of quantitative investing relative to conventional, fundamentals-based long-short strategies has caused a major upheaval in the hedge fund sector. The ability to quickly evaluate large volumes of data and create plans that are comparatively short-term seems to work better than the more deliberate and longer process that has historically led to long- and short-term investment choices.

The experience of the finance sector provides a more cautious outlook. One may argue that the removal of aggressive managers who demanded exorbitant fees in exchange for little performance gains is a thing to be happy about. But it appears that the financial markets are not doing so well at their main job, which is information processing, and things could even be getting worse. The rise of investors who focus too much on quickly changing information (quantitative funds) or purposefully ignoring information (passive investors) raises the possibility that the important task of evaluating sluggish, unclear, company-specific data may go undone. Industries that rely too heavily on quickly fluctuating hard data, including stock price fluctuations and real-time credit card spending data, may grow more and more dependent on data and computational power.

The financial market appears to be controlled at the moment by large businesses that provide commodities services at low costs but don't put enough emphasis on analyzing softer data. Realizing that hard statistics alone cannot provide the answers to the most

complex problems confronted by managers and leaders is the challenge facing the banking sector—and maybe all of us. Which tactics will make my company successful in ten years? Although objective data will undoubtedly influence these choices, it is unable to offer a conclusive solution. These choices demand commitment and creativity. As artificial intelligence (AI) advances and makes hard data more accessible and efficient, judgment calls will become more and more important.

Review of Literature

1. **"A Study on Artificial Intelligence in Finance Sector"- Soni P, International Journal of Creative Research Thoughts (IJCRT), 2021:** It is widely acknowledged by experts that artificial intelligence (AI) will soon become an integral component of human existence. This transformative technology has the potential to revolutionize our perception of the world, bringing about significant changes. One of the remarkable aspects of AI is its ability to swiftly address numerous challenges, providing solutions within minutes. However, there is a concern that AI may diminish human requirements, necessitating a harmonious adjustment on our part to adapt to these advancements. It is crucial to remember that we are the creators of machines and not the other way around. By effectively harnessing the power of AI, we can reap its benefits and enhance our lives.

2. **"AI in Finance: Challenges, Techniques and Opportunities"- Longbing Cao, June 2021: 40 pages:** AI in the field of finance has been a prominent area of research for many years, with a growing emphasis on interdisciplinary collaboration and integration between AI, data science, machine learning, finance, and economics. This comprehensive review provides a detailed and thorough examination of the strengths and weaknesses of both traditional and modern AI techniques in finance. Specifically, it focuses on the utilization of data-driven methods in financial applications. The review also stimulates discussions regarding the unresolved issues and future prospects of new-generation AI in finance, as well as the potential synergies that can be achieved.

3. "**Artificial Intelligence In Finance. Understanding how automation and machine learning is transforming the financial industry", Manju Kunwar, 2019:** It is evident that AI applications can be utilized by any business for financial and accounting decisions. The continuous advancement of AI technology ensures its presence in our daily lives. It is imperative for both businesses and society as a whole to adapt to the latest technological developments. Companies will need to incorporate AI in order to remain competitive, and employees may need to enhance their skill sets to secure their jobs. From my perspective, the implementation of AI will have a positive impact on the efficiency of financial functions. AI can facilitate better communication with employees and clients, analyze data from various sources to identify patterns or connections that may not be apparent to humans, and provide real-time investment insights. As AI continues to evolve, many decision-making responsibilities will likely shift from individuals to intelligent systems in the near future. Nevertheless, data privacy is expected to emerge as a major challenge for AI. The utilization of AI has the potential to stimulate the global economy and promote overall prosperity.

4. **Dipl.-Betriebswirt Thorsten Vocke, University of West Bohemia, Plzeň, Faculty of Economics, Study Program: Economics and Management:** It is recommended that financial organizations start using machine learning and artificial intelligence in their varied operations. The use of AI and machine learning in various financial applications in the future might be influenced by several variables. These elements include the development of new laws and regulations, as well as the augmentation of processing power, data storage capacity, and data quality. It is anticipated that the use of AI in finance will grow, posing ethical, legal, economic, and societal issues. But there are still a lot of dangers involved with using AI in banking, especially in unproven situations like financial crises. There have been cases documented when algorithms created by financial organizations have exhibited erratic behavior, leading to errors, mishaps, and flash crashes.

5. **"Artificial Intelligence in Financial Services: An analysis of the AI technology and the potential applications, implications, and risks it may propagate in financial services", Mardanghom, R., & Sandal, H. 2019:** Based on our research findings, it is evident that AI is being rapidly integrated into various organizations and sectors. AVO Consulting and Accenture have both

highlighted the numerous opportunities that AI presents to financial institutions, including recruitment, cost reduction, fraud prevention, investments, and communication. This implementation of AI is expected to bring about significant changes in traditional procedures, leading to revolutionary practices within the industry. Accenture has specifically mentioned that they are witnessing a clear shift in this domain, expanding their expertise and undertaking a greater number of projects. Additionally, AVO has emphasized its extensive client portfolio, which benefits from the development and continuous improvement of its AI systems. Lastly, Karabin is also witnessing the impact of this technological shift in their day-to-day projects, spanning across banking and technology companies.

6. "Artificial Intelligence & Machine Learning in Finance: A literature review"- Wassima Lakhchini, Rachid Wahabi, Mounime El Kabbouri, International Journal of Accounting, Finance, Auditing, Management and Economics, 2022: Undoubtedly, the financial sector stands to benefit greatly from the advancements in AI and ML technologies. The influence of AI on organizational operations and investment decisions is becoming increasingly apparent as society leans more toward digital processes and online platforms in response to changing circumstances. Some large multinational corporations leading the way in big data and AI may not always prioritize individuals' rights when utilizing data for commercial or political purposes. Therefore, it is imperative for AI systems to prioritize the safety and security of citizens and act as a protective force for the greater good (Stahl, 2021). Consequently, the diagram below highlights the key components of the diverse applications of AI. The financial industry is embracing cloud-based technologies and AI-driven services to offer optimal solutions to consumers in order to stay competitive and innovative in the face of ongoing challenges. This literature review has provided valuable insights into the evolution of AI and ML in financial research, aiding in refining our focus and selecting the appropriate research methodology, specifically a scoping review approach, to explore and analyze the functionalities of these technologies.

7. "Applications of artificial intelligence in business management, e-commerce, and finance", H. Pallathadka, Edwin Hernan Ramirez-Asis, Telmo Pablo Loli-Poma: AI has been implemented in the e-commerce and financial sectors to enhance customer satisfaction, streamline supply chain operations, improve operational efficiency, and optimize product quality control methods, all while seeking innovative ways to engage and serve customers at a reduced cost. Deep learning and machine learning stand out as the predominant AI methodologies utilized for these purposes. These advanced models are leveraged by individuals, businesses, and governmental entities to analyze and derive insights from vast datasets. Currently, machine learning algorithms are being developed to handle the intricate and varied data present in the food industry. This paper delves into the applications of machine learning and artificial intelligence in e-commerce, corporate management, and financial services. Key areas of focus include boosting sales, maximizing profits, forecasting sales trends, managing inventory, enhancing security measures, detecting fraudulent activities, and optimizing portfolio management.

8. "A Comprehensive Study on Integration of Big Data and AI in Financial Industry and its Effect on Present and Future Opportunities"- Sina Ahmadi, International Journal of Current Science Research and Review, 2024, 07 (01): To summarize, this study has demonstrated that a well-organized integration of AI and Big Data in the finance sector has the capability to elevate the potential of financial industries to a higher standard. This signifies not just a change in the existing operations within financial sectors but also a noteworthy advancement towards growth and advancement. The amalgamation of AI and Big Data is extremely groundbreaking, and when utilized effectively, it can revolutionize current possibilities and cultivate future prospects for the benefit of humanity.

9. "Artificial Intelligence for the Financial Services Industry: What Challenges Organizations to Succeed"- Kruse, L., Wunderlich, N., & Beck, R. (2019): The shift in focus from "mobile first" to "AI first" by Google, along with the rise of AI start-ups, suggests that AI has the potential to revolutionize the financial services industry in the coming years. Companies that do not adapt to this technological shift may face challenges in terms of efficiency and costs, leading to a loss of market share. The current perception of AI is a mix of excitement and concern, as its applications offer great promise but also come with certain risks. The

future of AI in finance will depend on how effectively the industry addresses these challenges. Banks and insurance companies have the opportunity to leverage their traditions and values to navigate the ongoing technological advancements and solidify their position in a digital future.

Research Methodology

A technical word used to describe the many methods and procedures for locating, gathering, and evaluating data on a certain issue is "research methodology." It is the manner in which researchers organize their work to use certain research instruments to get the intended outcomes. It encompasses every aspect of a study that is required, including the basic framework that a researcher works within, study design, data collection strategies, and data analysis procedures. A research technique provides studies with credibility and ensures that the results are supported by science. Additionally, it provides a thorough strategy that keeps researchers moving in the correct direction, making the approach efficient, accessible, and clean. The reader may more easily identify the methods and approaches utilized to arrive at results by knowing the researcher's approach.

Types of Research Methodology

Descriptive Research

Descriptive research is designed to accurately and systematically depict a population, situation, or phenomenon. It focuses on answering the "what" question without delving into the "how," "when," or "why." This methodology is crucial for providing a detailed snapshot of the subject under investigation, making it valuable for surveys, observations, case studies, and archival research. Examples of descriptive research include market research surveys and demographic studies, which provide factual descriptions of characteristics and behaviors.

Exploratory Research

Exploratory research is carried out to clarify ambiguous problems, discover new insights, and identify variables and hypotheses for future research. It is adaptable and often acts as a precursor to more detailed studies. Methods such as literature reviews, expert interviews, focus groups, and pilot studies are commonly utilized. This type of research is well-suited for initial investigations to comprehend consumer behaviors, conduct feasibility studies, and develop early-phase research projects.

Qualitative Research

Qualitative research concentrates on comprehending human behavior, experiences, and interactions from the viewpoint of those being studied. It is more flexible and open-ended compared to quantitative research, allowing for a thorough exploration of complex issues. Methods include in-depth interviews, participant observations, focus groups, and content analysis. This approach is appropriate for ethnographic studies, case studies, and narrative research, providing a profound understanding of social phenomena.

Quantitative Research

Quantitative research entails the systematic empirical examination of observable phenomena through statistical, mathematical, or computational techniques. Its objective is to quantify data and generalize results from a sample to the population of interest. Common methods include surveys with closed-ended questions, experiments, longitudinal studies, and statistical analysis.

Statistical Tools adopted

In this study, the help of graphs and chart presentation was taken to evaluate the data.

Sampling Technique

A simple questionnaire consisting of 12 questions was prepared with the main purpose of gathering the data on the priority attributes for the analysis.

Hypothesis

The hypothesis proposed here is as mentioned below:

H0: Artificial Intelligence has not influenced the Finance sector in a positive way and has led to a decrease in economic growth.

H1: Artificial Intelligence has positively impacted the Finance sector and has aided economic growth.

Data Types and Sources

Primary data

Primary data is defined as information that is gathered directly by the researcher for the sole purpose of the study. This kind of data is authentic and distinct, offering direct and pertinent insights that are applicable to the research questions at hand. Various methods can be employed to collect primary data, such as surveys, interviews, focus groups, and observations. For example, conducting a survey among a particular segment of the population can provide firsthand data regarding consumer preferences. The primary advantage of using primary data is its relevance and specificity to the research objectives, ensuring that the data obtained directly aligns with the needs of the study. However, it is important to note that collecting primary data can be a time-consuming and expensive process, necessitating careful planning and allocation of resources.

Secondary data

Secondary data refers to the utilization of pre-existing information that was originally collected for different purposes but is repurposed by the researcher for a fresh analysis. This form of data can be sourced from various outlets, including government reports, academic journals, industry publications, and historical records. An illustrative example of employing secondary data is the utilization of census data to examine demographic patterns, which is a widely practiced application. The primary advantage of secondary data lies in its accessibility and cost-effectiveness, as it obviates the necessity for the researcher to gather new data. However, it is important to note that secondary data may not always align perfectly with the specific requirements of the research study, and its accuracy and relevance must be critically assessed prior to utilization.

Population

Set of maximum people having knowledge of Artificial Intelligence and Finance Sector to which the findings are generalized.

Sampling Frame

A random Sampling technique was used by which different groups of people belonging to different professions and age groups were selected.

Sample Size

A sample size of 77 Respondents was selected for the effective study.

Study Area

Mumbai being the Finance capital of India, is expected to have a thorough knowledge about the advanced technology and finance sector development, so the study was conducted throughout the city of Mumbai.

Limitations

This study, while comprehensive, has several limitations that need to be acknowledged:

Geographical Restriction to Mumbai: The research is confined to the city of Mumbai, which may limit the generalizability of the findings. The unique socio-economic and cultural context of Mumbai may not be representative of other regions, potentially affecting the broader applicability of the results.

People's Biases: The data collected may be influenced by inherent biases among the participants. Respondents' personal beliefs, experiences, and social desirability can affect their responses, introducing a degree of subjectivity that may impact the study's accuracy and reliability.

Changes in Opinions Over Time: Opinions and behaviors of individuals are subject to change over time. The data collected represents a specific point in time, and these perspectives may evolve, potentially affecting the relevance and validity of the findings in the future. This temporal limitation must be considered when interpreting the results.

Sample Size of 77: The study's sample size is limited to 77 participants, which may not be sufficiently large to ensure the findings are representative of the broader population. A small sample size can limit the statistical power of the study and the generalizability of the results.

Time and Resource Constraints: Limited time and resources can affect the depth and scope of the study. Constraints on time may lead to a narrower focus or rushed data collection, while limited resources might restrict access to necessary tools or participants.
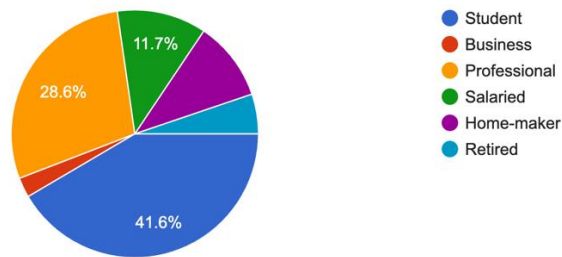
Data Analysis and Presentation

WE TOOK THE SURVEY: QUESTIONNAIRE METHOD AND RESULTS WERE AS FOLLOWS: WE GOT 77 RESPONSES TO THE COMPULSORY QUESTIONS ASKED BELOW:

What is your gender?
77 responses

- Male
- Female

58.4%

41.6%
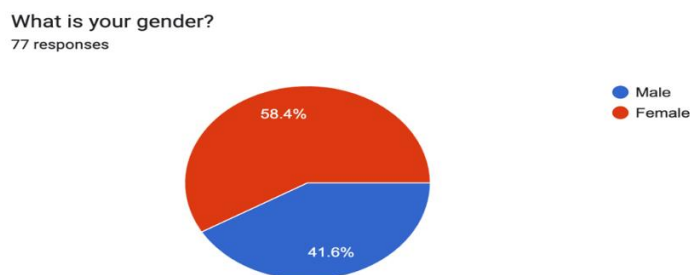
The research study, with 77 responses, presents a gender distribution where 58.4% are female and 41.6% are male.

What is your profession?
77 responses

The study reveals a diverse demographic breakdown of professions among respondents. Students constitute 41.6%, followed by professionals at 28.6%. Salaried individuals make up 11.7%, while homemakers and retirees account for 10.4% and 5.2% respectively. Interestingly, only a small percentage, 2%, identify as being in business. This distribution could indicate varying levels of involvement and perspectives based on occupational roles within the study's context.

What is your age group?
77 responses
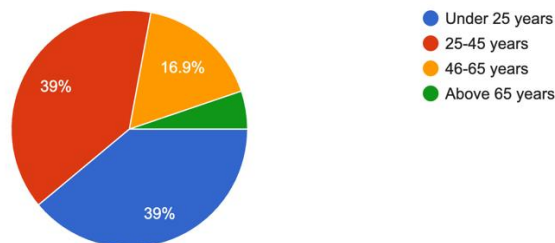
The age distribution among respondents demonstrates a fairly even spread across different age groups. Approximately 39% fall under the category of under 25 years and another 39% belong to the 25-45 years range. Those aged between 46-65 years constitute 16.9% of the respondents, while those above 65 years make up 5.2%. This balanced distribution across age groups could provide a comprehensive perspective on the study's subject matter, encompassing a wide range of experiences and viewpoints.
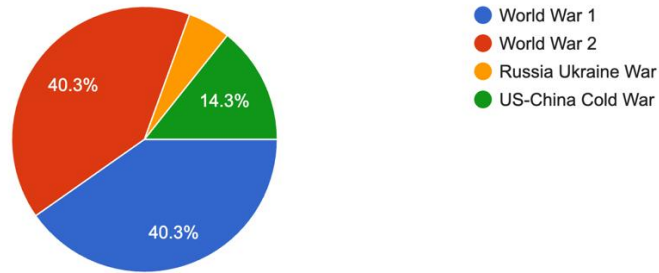
What is Artificial Intelligence?
77 responses
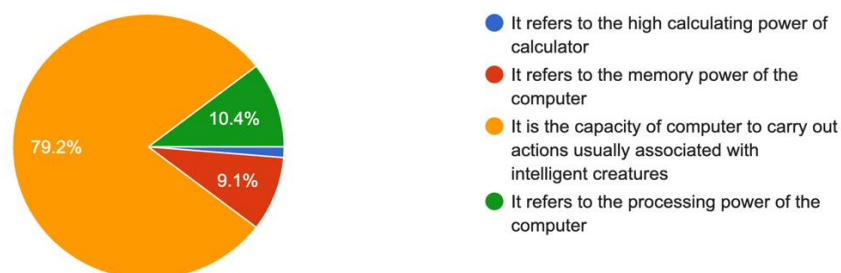
79.2% of the respondents think of Artificial Intelligence as the capacity of computers to carry out actions usually associated with intelligent creatures.

AI began by Alan Turing during?
77 responses

Analyzing the survey results, it's evident that respondents are evenly split between two options: World War 1 and World War 2, both receiving 40.3% of the responses. This suggests a lack of consensus or clarity among participants regarding the timing of AI's beginnings. However, historical records confirm that AI research predominantly emerged during and after World War 2, aligning with Alan Turing's influential contributions.

According to you which is the most popular AI?
77 responses
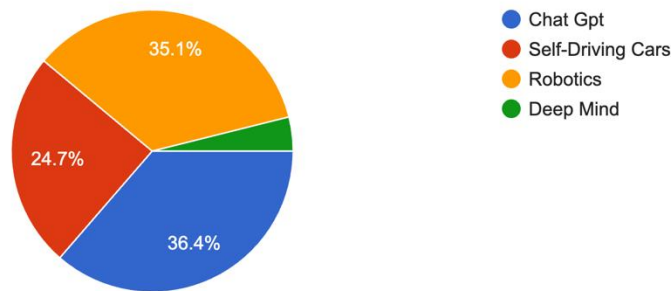
Among the options provided, the most popular AI according to the survey results is split between ChatGPT and Robotics, with 36.4% and 35.1% of respondents respectively associating them as the most popular AI. Self-driving cars follow closely behind at 24.7%. DeepMind, while a significant player in AI research, garners a lower percentage of 3.9%. This distribution reflects a diverse understanding of what constitutes "popular" AI, with some respondents favoring conversational AI like ChatGPT, others emphasizing robotics, and a notable interest in autonomous vehicles.

Artificial Intelligence has the potential to transform many aspects of our lives including our employment, health, privacy, media consumption and commute.
77 responses
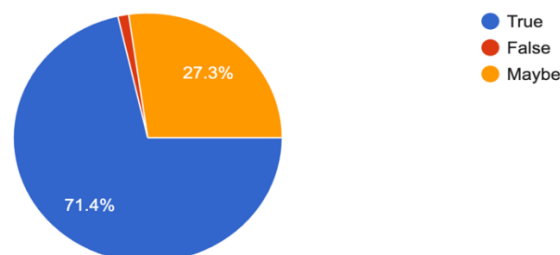
The survey results indicate a strong consensus among respondents, with 71.4% affirming that Artificial Intelligence has the potential to transform various aspects of our lives, including employment, health, privacy, media consumption, and commuting. A smaller percentage, 27.3%, express uncertainty by selecting "maybe," while only 1.3% outright refute this statement as false. This overwhelming agreement underscores the widespread recognition of AI's transformative capabilities across multiple domains, albeit with some acknowledgment of uncertainty regarding the extent of its impact.
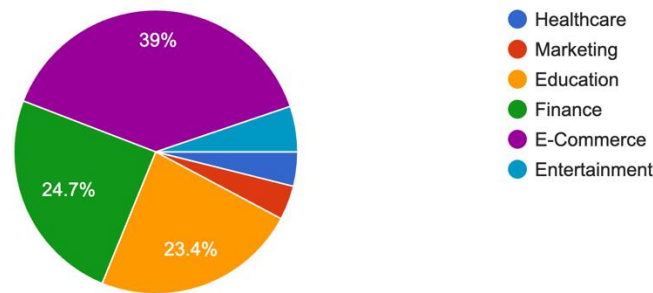

According to the survey results, respondents perceive e-commerce as the industry where Artificial Intelligence is being applied the most, with 39% selecting this option. Finance follows closely behind at 24.7%, indicating a significant application of AI in the financial sector. Education also garners notable recognition at 23.4%. Healthcare, marketing, and entertainment receive lower percentages of 3.9%, 3.9%, and 5.2% respectively, suggesting comparatively less perceived application of AI in these industries.
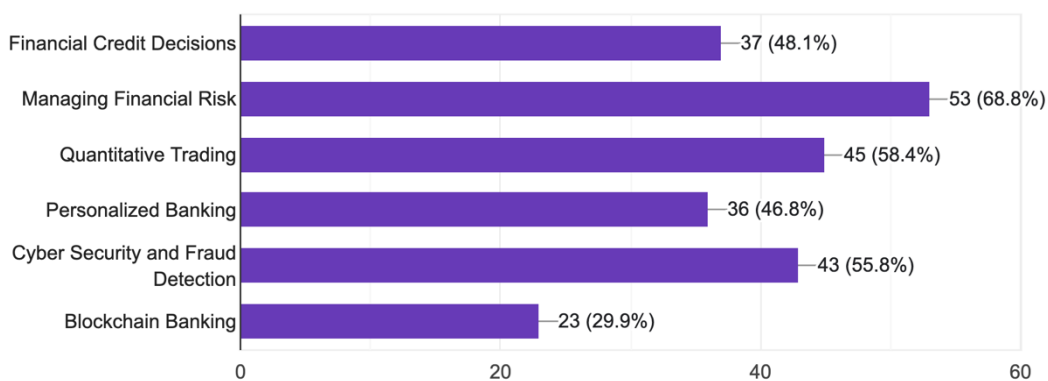

AI is integral to the multifaceted operations of financial institutions, providing support in diverse areas. It assists in managing financial risk and quantitative trading, leveraging advanced analytics for informed decision-making. Additionally, AI enhances cybersecurity measures, aiding in fraud detection and protection of financial assets. While also contributing to personalized banking experiences, its evolving role in emerging technologies like Blockchain Banking highlights its ongoing impact on reshaping the financial landscape.

**What are the advantages of using AI in Finance?**
77 responses
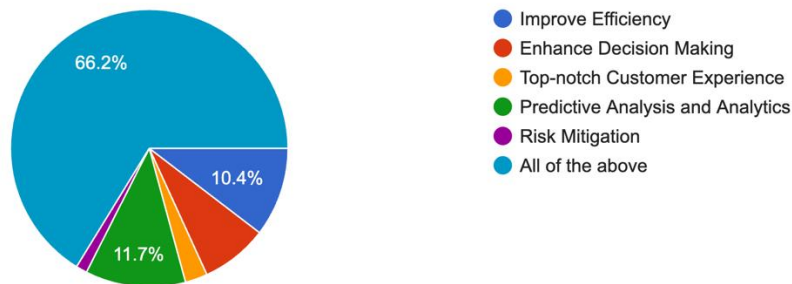
The survey results suggest a consensus among respondents regarding the wide-ranging benefits of integrating AI into financial operations. By selecting "all of the above" at a significant rate of 68.2%, respondents acknowledge AI's role in improving efficiency, enhancing decision-making, providing top-notch customer experiences, predictive analytics, and risk mitigation. This indicates a recognition of AI's multifaceted contributions to streamlining processes, optimizing performance, and ensuring a competitive edge within the finance sector.

**What are the challenges of using AI in Finance?**
77 responses
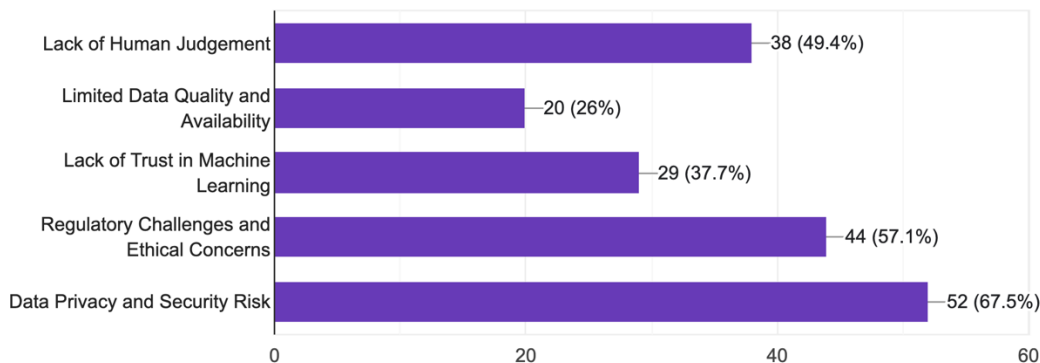
The survey reveals notable challenges confronting the integration of AI into finance. Concerns primarily revolve around data privacy and security risks, with a significant majority of respondents, 67.5%, expressing apprehension in this regard. Regulatory hurdles and ethical dilemmas also loom large, acknowledged by 57.1% of respondents. Moreover, there's a noteworthy lack of trust in machine learning, cited by 37.7%, alongside reservations about the absence of human judgment in AI-driven decision-making, mentioned by 49.4% of respondents. These findings emphasize the imperative of addressing these multifaceted challenges to foster responsible and effective AI implementation in financial domains.

AI has positively impacted finance industry and is redefining banking and financial services
77 responses
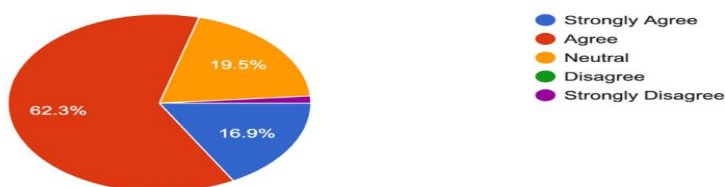
The overwhelming majority of respondents, with 79.2% either strongly agreeing or agreeing, recognize the positive impact of AI on the finance industry. This sentiment reflects a widespread acknowledgment of AI's transformative role in reshaping banking and financial services. While a notable proportion remains neutral at 19.5%, no respondents express disagreement, indicating a prevailing consensus regarding AI's significant contributions to enhancing efficiency, decision-making, and customer experiences within the finance sector.

CONCLUSION

The field of artificial intelligence (AI) in computer science focuses on building intelligent computers that function and carry out activities much like people. These machines have the capacity to organize, learn from, and understand data in order to provide predictions. It is hardly surprising that artificial intelligence is booming in the financial sector given its increasing prevalence across many industries, particularly in light of the ways that COVID-19 has altered human interaction. Artificial intelligence (AI) has had a significant influence on the banking sector, and analysts estimate that by 2030, it will save the sector around $1 trillion by simplifying and combining activities and analyzing data and information far faster than humans. As a result, it has evolved into a crucial component of technology in the banking, financial services, and insurance (BFSI) sector, revolutionizing the way goods and services are provided. Credit applications are being evaluated and processed by neural networks more and more; deep learning is being utilized by businesses to examine massive amounts of data. This aids in the prevention of fraud and makes it possible to automate resource-intensive, repetitive procedures and customer support without sacrificing quality.

Despite their recognition of AI's promise in the current digital era, banks and insurance businesses have not yet completely used it. There is still a significant gap between the ideal and the reality, even though most executives (62%) believe artificial intelligence (AI) is a moderately important or very important breakthrough that will grow even more relevant in the financial industry over the next five years. Only 9% of these executives think their organization is currently extremely well-positioned to use AI. Banks and insurers are only now beginning to understand the many uses for this quickly developing technology. The outcome is that there is a significant and ever-widening gap between expectations and implementation.

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Appendix

Questionnaire

Q1. What is your gender? *

- o Male
- o Female
- o Other

Q2. What is your profession? *

- o Student
- o Business
- o Professional
- o Salaried
- o Home-maker
- o Retired

Q3. What is your age group? *

- o Under 25 years
- o 25-45 years
- o 46-65 years
- o Above 65 years

Q4. What is Artificial Intelligence? *

- o   It refers to the high calculating power of the calculator
- o   It refers to the memory power of the computer
- o   It is the capacity of a computer to carry out actions usually associated with intelligent creatures
- o   It refers to the processing power of the computer

Q5. AI was begun by Alan Turing during? *

- o   World War 1
- o   World War 2
- o   Russia-Ukraine War
- o   US-China Cold War

Q6. According to you which is the most popular AI? *

- o   Chat Gpt
- o   Self-driving cars
- o   Robotics
- o   Deep Mind

Q7. Artificial Intelligence has the potential to transform many aspects of our lives including our employment, health, privacy, media consumption, and commute. *

- o   True
- o   False
- o   Maybe

Q8. Artificial Intelligence is being applied the most in which of the following industries? *

- o   Healthcare
- o   Marketing
- o   Education
- o   Finance
- o   E-Commerce
- o   Entertainment

Q9. AI aids financial institutions analyze, manage, invest and protect money by helping them in? *

- o   Financial Credit Decisions
- o   Managing Financial Risk
- o   Quantitative Trading
- o   Personalized Banking
- o   Cyber Security and Fraud Detection
- o   Blockchain Banking

Q10. What are the advantages of using AI in Finance? *

- o   Improve Efficiency
- o   Enhance Decision Making
- o   Top-notch Customer Experience
- o   Predictive Analysis and Analytics
- o   Risk Mitigation
- o   All of the above

Q11. What are the challenges of using AI in Finance? *

- o   Lack of Human Judgement
- o   Limited Data Quality and Availibility
- o   Lack of Trust in Machine Learning
- o   Regulatory Challenges and Ethical Concerns
- o   Data Privacy and Security Risk

Q12. AI has positively impacted finance industry and is redefining banking and financial services. *

- o   Strongly Agree
- o   Agree
- o   Neutral
- o   Disagree
- o   Strongly Disagree