IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Everything About Finance With Artificial Intelligence And Machine Learning

[1]Saniya S Save, [2]Gaurav R Patil

[1]Student, [2]Student

[1]Master of Computer Application,

[1]Viva Institute of Technology, Virar, India

[2]Master of Computer Application,

[2]VIVA Institute of Technology, Virar, India

Abstract: Recently, due to the rapid development of artificial intelligence (AI) and machine learning, its application has been widely used in many fields of finance, as well as it had a significant impact on the financial market, institutions, and regulation. Artificial intelligence technology brings a major change to the entire financial industry, which creates a series of innovative financial services such as intelligent consultants, intelligent lending, monitoring and warning, and intelligent customer service as times required. This paper aims to summarize the development and application of artificial intelligence and machine learning in the financial industry, as well as its impacts on macroeconomics and microeconomics. In the meantime, it is realised that many of the problems and risks were conducted by artificial intelligence during its use. Lastly, some suggestions and strategies are provided for reasonable usage of artificial intelligence in financial risk management, based on the financial risk management raised by artificial intelligence.

Index Terms **- Artificial Intelligence, Development, Financial Industry, Machine Learning, Risk Management.**

I. INTRODUCTION

Although synthetic intelligence dates lower back greater than 1/2 of a century, its opportunities have extended considerably in current times. This is prompting the improvement of several sensible applications, each withinside the economic and different sectors. Artificial intelligence gear can offer essential benefits, permitting sure obligations to be automatic and boosting analytical capability as compared with conventional techniques. However, in addition, they gift a sequence of obstacles which could cause them to wrong for sure activities, at the side of a fixed of dangers that need to be controlled appropriately. [1]

Artificial Intelligence finds its applications in a different context in today's business scenario. Practitioners and academicians accept as true with that Artificial Intelligence is the destiny of our society. With the advancement of technology, the world has become a web of interconnected networks. The technology implementation lead to investment in Artificial Intelligence (AI) for big data analytics to generate market intelligence. Artificial Intelligence packages aren't confined to simplest marketing; rather, it's miles widely used in other sectors such as medicine, e-commerce business, education, law, and manufacturing. AI is continuously getting implemented to benefit many different industries. As organizations move forward towards Industry 4.0, Artificial Intelligence & other emerging technologies are also evolving parallelly. However, the implementation of AI in all sectors has not been possible due to many constraints, but scientists are working on systems that cater to the theory of mind and self-awareness of artificially intelligent systems.

II. ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) is increasingly deployed via way of means of monetary offerings to vendors throughout industries in the monetary sector. It has the potential to transform business models and markets for trading, credit, and blockchain-based finance, generate efficiencies, reduce friction, and enhance product offerings. With this capacity comes the priority that AI can also increase dangers already found in economic markets, or supply upward thrust to new demanding situations and dangers. This is turning into an extra preoccupation amidst the excessive increase of AI programs in finance. AI is an extensive time period that pertains to improvements that make machines "intelligent. John McCarthy coined the time period AI in 1956. There are several exceptional phrases associated with AI, for example, deep learning, ML, image recognition, herbal language processing (NLP), cognitive computing, cognitive augmentation, system augmented intelligence, and augmented intelligence.AI, used here, consists of all of those ideas. (Yaninen 2017.) AI's goal is to broaden a smart and self-reliant system.ML is an AI subset that permits the laptop to analyse and enhance its know-how robotically without express programming. There are two methods AI operates, one is symbolically based, and another is data-based. For the database side called ML, we need to feed the machine lots of data before it can learn. The machine can learn in many more dimensions. The machine can look at a lot of high-dimensional data and determine patterns. Once those fashions are learned, they could create forecasts that human beings can't even approach. (Takyar 2018).

Artificial Intelligence can be used abundantly in processes which involve auditing of financial transactions. Also when it comes to analysing an enormous number of pages of the tax changes, AI can be of great help. It can be expected in the near future to see companies relying on AI to make significant firm related decisions. AI also has the capability to identify how customers are going to react to various situations and problems. Artificial Intelligence is going to help people and firms make smarter decisions at a very quick pace. But the key here is to find the right balance between humans and machines. [2]

III. MACHINE LEARNING

Machine mastering belongs below the umbrella of synthetic intelligence. It offers designing and growing algorithms that could analyze from and make predictions primarily based totally on data. Machine mastering fashions offer the generation to automate cognitive tasks. Various economic duties make use of systems gaining knowledge of technology, along with credit score scoring, funding tracking and recommendations, fraud detection, and algorithmic trading. Machine-gaining knowledge can assist economic organizations to make higher pricing, risk, and purchaser conduct decisions. The technology can build models that improve understanding of large data sets and uncover patterns that facilitate new business systems and processes. Machine learning in finance is now considered a key aspect of several financial services and applications, including managing assets, evaluating levels of risk, calculating credit scores, and even approving loans. Machine learning is a subset of data science that provides the ability to learn and improve from experience without being programmed.

Until recently, only the hedge funds were the primary users of AI and ML in Finance, but the last few years have seen the applications of ML spreading to various other areas, including banks, fintech, regulators, and insurance firms, to name a few. Right from speeding up the underwriting process, portfolio composition and optimization, model validation, Robo-advising, and market impact analysis, to offering alternative credit reporting methods, the different use cases of Artificial Intelligence and Machine Learning are having a significant impact on the financial sector. The finance industry, including the banks, trading, and fintech firms, are rapidly deploying machine algorithms to automate time-consuming, mundane processes, and offering a far more streamlined and personalized customer experience.

3.1 Machine learning has many applications in the financial sector, including:

3.1.1 Fraud detection: using algorithms to detect unusual patterns of behavior in transactions and flag potentially fraudulent activity.

3.1.2 Risk management: using machine learning models to analyze market data and predict potential financial risks.

3.1.3 Customer behavior analysis: using algorithms to analyze customer data and understand their spending habits, preferences, and financial behaviors.

3.1.4 Portfolio optimization: using machine learning algorithms to optimize investment portfolios for maximum returns and minimum risk.

3.1.5 Algorithmic trading: using machine learning models to make trades on financial markets based on market data and predictions.

3.1.6 Loan underwriting: using machine learning algorithms to analyze borrower data and determine their creditworthiness for loan applications.

3.1.7 Predictive analytics: using machine learning algorithms to predict future market trends and investment outcomes. [3]

IV. DEVELOPMENT AND APPLICATION OF AI AND ML IN THE FINANCE FIELD

4.1 The Development of Artificial Intelligence in the Financial Field

With the rapid development of artificial intelligence technology, AI is widely popularized in the financial field. Factors that accelerate the Fintech development, promote the development of artificial intelligence and machine learning in the financial field, and drive financial institutions to reduce cost, manage risk, improve quality of service, and increase profit by using AI and machine learning. In the early 1960s, one of the algorithms in machine learning-Bayesian Statistics become famous, it has been widely used in the financial area until now. Moreover, the reason that Bayesian Theory becomes popular in the financial area, is its application in the auditing area. In the auditing field, judgments made by auditors used to rely on professional knowledge and experience, but different cases have different situations. Various uncertain factors need to be considered in the decision-making of auditing. Therefore, the Bayesian model provides objective and rational probability to the auditor and help them to make a more accurate assessment, as well as reducing the misjudgment caused by auditors' personal emotion. In the initial stage of cooperation between artificial intelligence and the financial industry, it focuses on reducing the workload of financial practitioners by computing the power of computers. Until the 1980s, Expert Systems (intelligence systems based on knowledge) is used in the financial industry to predict the trend of the market and provide the customized financial plan. A basic Expert System includes six components, which are a knowledge base, database, inference engine, explanation facility, knowledge acquisition, and user interface. Hodgkinson and Walker raised a rule-based Expert System to achieve a decision-making process, which helps financial intuitions to make decisions on credit applications for cooperating credit loans. Shue et al. establish Expert System contains a domain knowledge base and an operational knowledge base, to credit the ranking of listed companies in the Taiwan stock market. Janulevicius and Goranin built up a risk management Expert System to help middle and small-sized enterprise to solve the problem of lack of access to professional data security analysis due to limited funds.

4.2 Application of Artificial Intelligence in the Financial Field

The application of artificial intelligence and machine learning in the financial field can be divided into four aspects. Firstly, it is customer-oriented (front-end) applications, including credit scoring, insurance, and customer-oriented service robot; second, management-level (back-end) applications, including capital optimization, risk management, and market impact analysis; thirdly, financial market transactions and portfolio management; lastly, AI and machine learning are used in financial institutions for "RegTech" or financial regulators for "SupTech". In addition, AI and machine learning are widely used in specific scenarios

such as quantitative transactions in the financial field, natural language processing, semantic search, and intelligence investment consultants.

V. HOW IS AI AFFECTING PARTS OF THE FINANCIAL MARKETS?

AI strategies are carried out in asset control and the buy-facet interest of the marketplace for asset allocation and inventory choice primarily based totally on ML models' capacity to pick out indicators and seize underlying relationships in big data, as well as for the optimization of operational workflows and risk management. The use of AI techniques may be reserved for larger asset managers or institutional investors who have the capability and assets to put money into such technologies. When utilized in trading, AI provides a layer of complexity to traditional algorithmic trading, because the algorithms learn from statistics inputs and dynamically evolve into computer-programmed algos, capable of picking out and executing trades with no human intervention. In highly digitized markets, such as equities and FX markets, AI algorithms can enhance liquidity management and execution of large orders with minimal market impact, by optimizing size, duration, and order size in a dynamic fashion, based on market conditions. Traders also can install AI for threat control and order glide control functions to streamline execution and convey efficiencies. Similar to non-AI fashions and algos, using identical ML fashions via way of means of a massive range of finance practitioners could potentially prompt herding behavior and one-way markets, which in turn may raise dangers for liquidity and balance of the system, especially in instances of stress. [4]

Although AI algo buying and selling can increase liquidity during normal times, it can also lead to convergence and as consequence bouts of illiquidity during times of stress and flash crashes. Market volatility may want to boom via big sales Or purchases finished simultaneously, giving an upward push to new reasserts of vulnerabilities. The convergence of buying and selling techniques creates the threat of self-reinforcing comment loops that can, in turn, cause sharp price moves. Such convergence additionally will increase the chance of cyber-attacks, because it turns less complicated for cybercriminals to persuade retailers to perform withinside the identical way.

The above-stated dangers exist in all styles of algorithmic trading, however, using AI amplifies associated dangers given their cap potential to analyze and dynamically modify to evolving situations in a completely self-sustaining way. For example, AI models can identify signals and learn the impact of herding, adjusting their behavior and learning to front run based on the earliest of signals. The scale of complexity and problem in explaining and reproducing the choice mechanism of AI algos and fashions makes it tough to mitigate those risks.AI strategies may want to exacerbate unlawful practices in buying and selling aiming to govern the markets and make it more difficult for supervisors to identify such practices if collusion among machines is in place. This is enabled because of the dynamic adaptive ability of self-getting to know and deep getting to know AI models, as they can recognize mutual interdependencies and adapt to the behavior and actions of other market participants or other AI models, probably achieving collusive final results with no human intervention and possibly without the consumer even being aware of it. [5]

VI. DATA MANAGEMENT

Data is at the center of any AI application, and the deployment of AI, ML models and big statistics gives possibilities for improved efficiencies, decreased costs, and more purchaser pleasure via the shipping of higher-first-rate services/products. This phase examines how using huge facts in AI-powered packages may want to introduce a vital supply of non-economic threats to such economic products/services, pushed with the aid of using demanding situations and dangers associated with the exception of the information used; information privateness and confidentiality; cyber security; and equity considerations. It discusses the threat of accidental bias and discrimination of components of the populace when facts are misused or irrelevant facts are being utilized by the model (e.g. in credit score underwriting). It examines the significance of facts on the subject of training, testing, and validation of ML models, but also when defining the capacity of such models to retain their predictive powers in tail event situations. In addition to monetary patron safety considerations, there are capability opposition problems springing up from the use of massive facts and ML models, regarding the ability to excessive attention among marketplace providers. It must be referred to that the demanding situations of statistics use and control recognized and discussed below are not specific to big data/alternative data, but apply to data more broadly.

VII. ALGORITHMIC TRADING

Algorithmic buying and selling refer to using algorithms to make higher alternate decisions. Usually, investors construct mathematical fashions that reveal commercial enterprise information and exchange sports

in real-time to stumble on any elements that may pressure safety fees to upward push or fall. The version comes with a predetermined set of commands on numerous parameters – such as timing, price, quantity, and different factors – for putting trades without the trader's lively involvement. Unlike human traders, algorithmic buying and selling can concurrently examine huge volumes of records and make heaps of trades each day. Machine mastering makes speedy buying and selling decisions, which offers human investors a bonus over the marketplace average. [6]

Also, algorithmic trading does not make trading decisions based on emotions, which is a common trouble amongst human buyers whose judgment can be stricken by feelings or non-public aspirations. The buying and selling approach is ordinarily hired via way of means of hedge fund managers and economic establishments to automate buying and selling activities.

Machine Learning in trading is another excellent example of an effective use case in the finance industry. Algorithmic Trading (AT) has, in fact, become a dominant force in global financial markets. ML-based solutions and models allow trading companies to make better trading decisions by closely monitoring the trade results and news in real-time to detect patterns that can enable stock prices to go up or down. Machine learning algorithms can also analyze hundreds of data sources simultaneously, giving the traders a distinct advantage over the market average. Some of the other benefits of Algorithm Trading include –

7.1 Increased accuracy and reduced chances of mistakes

7.2 AT allows trades to be executed at the best possible prices

7.3 Human errors are likely to be reduced substantially

7.4 Enables the automatic and simultaneous checking of multiple market conditions [7]

VIII. FRAUD DETECTION AND PREVENTION

Fraud is a first-rate hassle for banking establishments and economic offerings companies, and it is money owed for billions of bucks in losses every year. Usually, finance businesses hold a massive quantity of their records saved online, and it will increase the danger of a protection breach. With growing technological advancement, fraud withinside the monetary enterprise is now taking into consideration an excessive chance to treasured data. Fraud detection structures withinside the beyond had been designed primarily based totally on a fixed of rules, which may be effortlessly bypassed with the aid of using contemporary-day fraudsters. Therefore, maximum corporations nowadays leverage gadget studying to flag and fight fraudulent economic transactions. Machine getting to know works with the aid of using scanning via huge facts units to come across specific sports or anomalies and flag them for similar research with the aid of using protection teams. It works with the aid of using evaluating a transaction in opposition to different facts points – together with the customer's account history, IP address, location, etc.– to decide whether or not the flagged transaction is parallel to the conduct of the account holder. Then, relying on the character of a transaction, the gadget can mechanically decline a withdrawal or buy till a human makes a decision. [8]

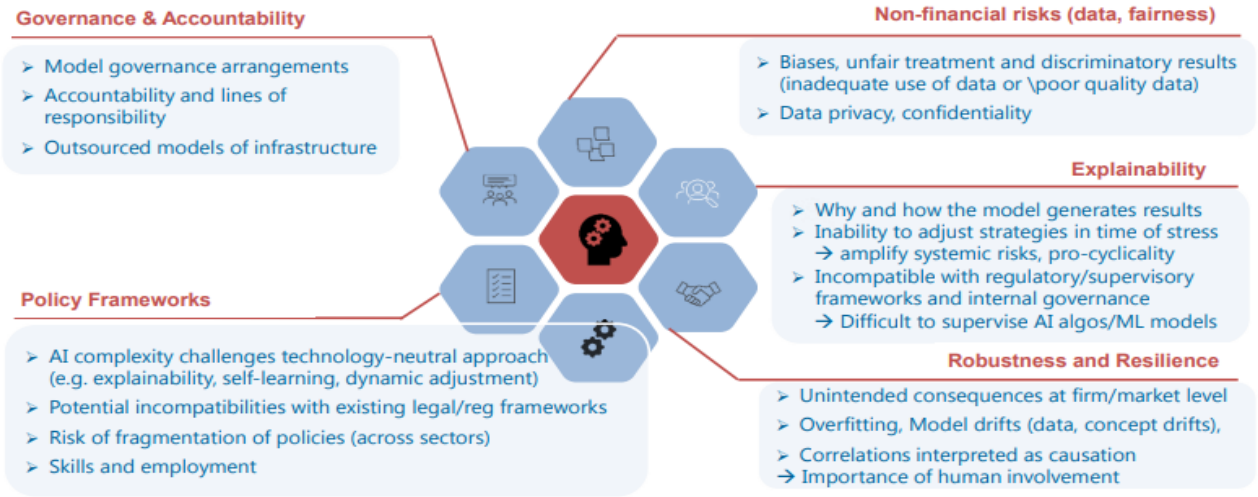
IX. RISK MANAGEMENT

Using machine learning techniques, banks and financial institutions can significantly lower the risk levels by analyzing a massive volume of data sources. Unlike the traditional methods which are usually limited to essential information such as credit score, ML can analyze significant volumes of personal information to reduce their risk.

Various insights gathered by machine learning technology also provide banking and financial services organizations with actionable intelligence to help them make subsequent decisions. An example of this could be machine learning programs tapping into different data sources for customers applying for loans and

assigning risk scores to them. ML algorithms could then easily predict the customers who are at risk for defaulting on their loans to help companies rethink or adjust terms for each customer.

X. RELEVANT ISSUES AND RISKS STEMMING FROM THE DEPLOYMENT OF AI IN FINANCE

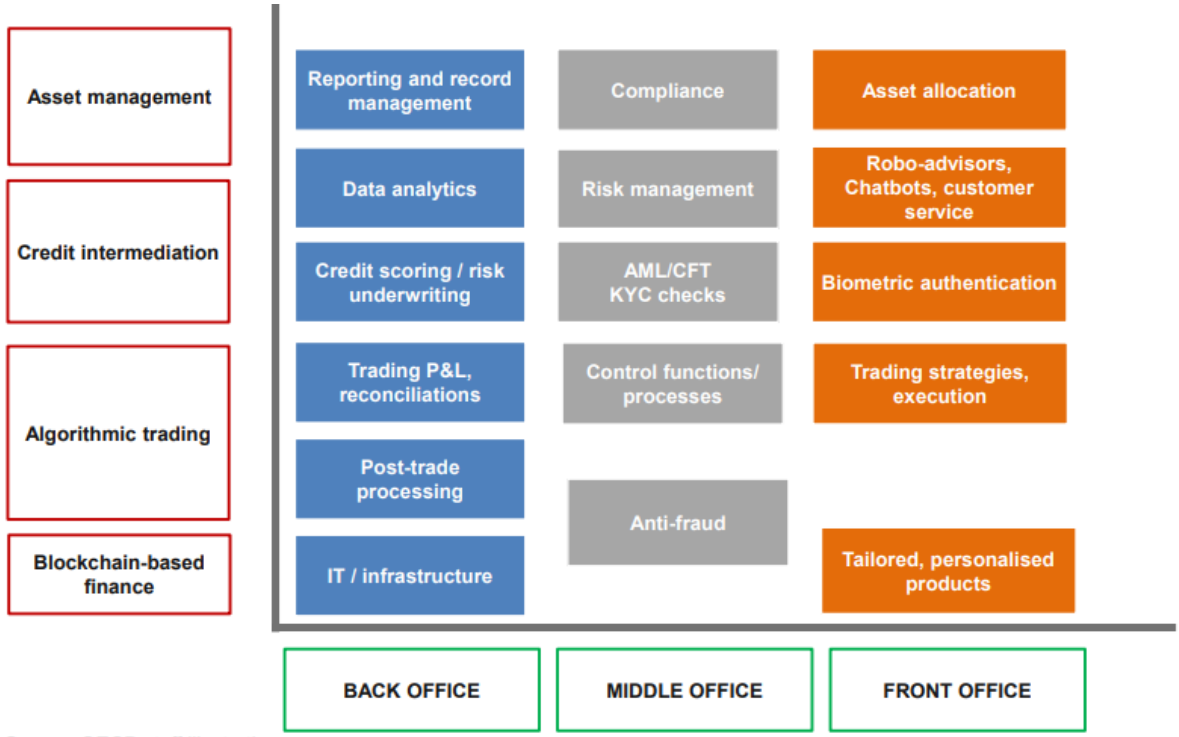


Source: OECD staff illustration.

XI. ADOPTION OF AI IN FINANCE

The adoption of AI in finance is pushed through the massive and developing availability of data inside economic offerings and the anticipated aggressive benefit that AI/ML can offer to economic offerings firms. The explosion withinside the abundance of to-be-had statistics and analytics (massive statistics), coupled with greater low-cost computing capacity (e.g. cloud computing) can be analyzed by ML models to identify signals and capture underlying relationships in information in a manner this is past the capacity of humans. The deployment of AI/ML and huge data through economic zone organizations is predicted to more and more power firms' aggressive advantage, thru both enhancing the firms' performance via way of means of lowering costs and improving the fine of monetary offerings products demanded with the aid of using customers (US Treasury, 2020). [1] This segment seems on the ability effect that uses AI and huge records and can also additionally have unique monetary marketplace activities, which include asset control and investing, trading; lending; and blockchain applications in finance.

EXAMPLES OF AI APPLICATIONS IN SOME FINANCIAL MARKET ACTIVITIES



Source: OECD staff illustration.

XII. CONCLUSION

The use of artificial intelligence applications in the financial sector is already a tangible reality that provides numerous benefits to market participants. However, it also poses a series of risks and limitations that must be known and managed so as to be able to correctly extract all their potential. To that end, a distinction must be drawn between the different types of activities for which these tools are used, since problems such as results

bias or difficulties interpreting the underlying reasoning are more important in some areas than in others. Accordingly, the advantages and drawbacks of using this technology, along with the way in which it should be used, need to be assessed on an individual case basis. One option which is relatively common and which in most cases offers a reasonable balance between risks and rewards is to use artificial intelligence tools together with (rather than instead of) traditional techniques. In other words, to use these tools as part of a process to reinforce and validate decisions, rather than accepting outright the results provided by algorithms.

REFERENCES

[1] Fernandez, Ana, Artificial Intelligence in Financial Services (April 5, 2019). Banco de Espana Article 3/19, Available at SSRN: https://ssrn.com/abstract=3366846 or http://dx.doi.org/10.2139/ssrn.3366846

[2] Pinakin Ariwala https://marutitech.com/ai-and-ml-in-finance/ .

[3] OECD (2021), Artificial Intelligence, Machine Learning and Big Data in Finance: Opportunities, Challenges, and Implications for Policy Makers, https://www.oecd.org/finance/artificial-intelligence-machine-learningbig-data-in-finance.htm

[4] Minzhen Xie 2019 J. Phys.: Conf. Ser. 1187 032084 Minzhen Xie The only suthor Room 701, No52 Hebinbei Road, Conghua District, Guangzhou, Guangdong, China (61)0402557505 Mxie0002@student.monash.edu

[5] Machine Learning (in Finance) Machine learning algorithms used to detect fraud, automate trading activities, and provide financial advisory services to investors Written by **CFI Team** Updated January 5, 2023 https://corporatefinanceinstitute.com/resources/data-science/machine-learning-in-finance/

[6] **Pinakin Ariwala** https://marutitech.com/ways-ai-transforming-finance/

[7] ACPR (2018), Artificial intelligence: challenges for the financial sector.

[8] J Danielsson, R Macrae, A Uthemann ,**Artificial intelligence, financial risk management and systemic risk, Systemic Risk Centre Special Paper** ,SP, volume 13, Posted: 2017

[9] ACPR (2020), Governance of Artificial Intelligence in Finance, https://acpr.banquefrance.fr/sites/default/files/medias/documents/20200612_ai_governance_finance.pdf (accessed on 6 April 2021)

[10] F Li, ZH Han, sEY Feng. Financial data analysis based on machine learning [J]. Sciences & Wealth, 2016, 6: 624.

[11] (n.a.) (n.d.), Infinitech - The project, https://www.infinitech-h2020.eu/the-project (accessed on 1 March 2021).