# Role of Machine Learning and Deep Learning in Mortgage Industry

KAVITHA ANANTH, KIRUBANAND V. B.
Research Scholar Department of Computer Science
CHRIST (Deemed to be University), INDIA

*Abstract:* — The development of applications utilizing Artificial Intelligence and Machine Learning has rapidly become more popular in the Mortgage sector. These institutions have tapped into their vast potential to provide front end and back end process enterprise applications that increase efficiency and enhance customer experience. The applications of Machine Learning and Deep Learning are explained throughout this paper, along with an evaluation of their usefulness in various business activities of the Mortgage industry. The use of cognitive computing by these organizations can improve their operations will additionally be discussed in this article. The Mortgage industry is being overtaken by machine learning and artificial intelligence technology, and it appears that there is little we can do to stop it.

*Key-words:* — ML (Machine Learning), DL ( Deep Learning), AI (Artificial Intelligence), IQ (Intelligent Quotient), EQ (Emotional Quotient),AML (Anti Money Laundering)

Received: March 19, 2024. Revised: August 14, 2024. Accepted: September 17, 2024. Published: October 31, 2024.

## 1. Introduction

Applications built using ML and DL in the Mortgage industry have been flourishing recently. These institutions have tapped into their vast potential to provide front - and back end process enterprise solutions that increase productivity and enhance customer experience [1]. We have seen in latest years how the most valuable tool for gaining an advantage is computational intelligence's capacity for decision-making. With outstanding outcomes, we can see that ML and DL. are poised to completely revolutionise the Mortgage Industry.

The paper will discuss the uses of Machine Learning and Artificial intelligence, assess their value in several banking industry primary activities, and explain how well these organizations might benefit from them. 12/31/2017 a source of assistance Declared: None, No Conflict of Interest. The usage of this work is subject towards the Inventive Decisions 4.0 Worldwide Agreement. The-NonCommercial (CC BY-NC) licence allows for the non-commercial remixing, altering, and building upon of previously published works. Pages 83–86 of Donepudi: Machine Learning and Artificial Intelligence in Banking Computational intelligence is successfully used by Engineering International to enhance their operations.

Without a question, ML and A.I. have certainly transformed the Mortgage Industry. When we analyze in numerous methods, this transformation has significantly improved the end to end of Mortgage processing. Even though most banking firms are still having trouble implementing machine learning technology, their use is becoming increasingly common throughout the sector. Consequently, it is accurate to claim that machine learning (ML) and artificial intelligence (AI) have created a massive change in the world's of Banking firms and Mortgage Industry. Importantly, the transition that is occurring in front of our eyes is largely due to the expansion of financial institutions. By example, a recent report on India's fintech industry's second quarter showed significant investment in the field and the closing of 32 deals during that time, which amply demonstrates the emergent of the Mortgage business.[2]

Fintech companies, are found to be embraced AI. They played a very critical role with its evolutionary computing technologies with products like Chatbot.[2]. Before anything else, it's important to define AI and ML. The science and engineering of creating intelligent machines, particularly intelligent computer programmes, is what John McCarthy, the founder of AI, properly describes as in [3]. In general, AI refers to a set of coding directives created to enable machines to communicate and think intelligently like people. By researching the way individuals learn, analyze, or use their minds to solve problems, AI is the technique for creating smart computer systems and processes that replicate human behaviour.

To put it another way, Artificial Intelligence (AI) is causing computers to explore Intelligent Quotient ( IQ) and Emotional Quotient (EQ). AI. and ML are not the same thing, not withstanding they are frequently used interchangeably. Several people think that the underlying assumption behind ML is the idea that these machines or systems can learn by itself. The fundamental principles of ML, and consequently, Artificial Intelligence, demonstrate about both disciplines which have existed throughout the past 50 years at this point. In 1959, IBM scientist Arthur Samuel authored a suggestion to the chess game as the first application of machine learning [4] According to his argument, a computer with the activity of "checkers" with humans for the first time ever and actually win. Programmers have developed more complex systems over time, allowing machines to

perform tasks that humans can. Another prominent example is the board game "Go," which has been played for more than 2500 years and was often thought to be more difficult and strategic than chess because of this; hence, no machine could win against a human with the activity of "Go." That idea was dispelled four years ago, however, when the computer programme AlphaGo defeated an 18-time world champion with a decisive score of 4 to 1.[5]

Changes in business practises have been expedited by ML and DL in the Mortgage sector. In this area, machine learning examines previous data and actions to recognize patterns and support decision-making [6]

# 2. Role of Machine Learning and Deep Learning in Mortgage Industry

As financial firms continue to integrate AI and ML, the scope of their potential applications grows daily. ML and DL play pivotal roles in transforming various aspects of the mortgage industry. However, the hazards that these two might bring are also growing. The mortgage industry is not the only one being transformed by robotic process automation; capital markets and insurance are two more. In the banking sector, AI. and ML and deep learning are mostly utilised for automation, analysis, and decision-making, which results in the creation of novel business strategies.

According to [7], future customer interactions between banks and their clients will be determined by AI and ML applications. According to a recent study by the consulting firm BCG, China is far ahead of other countries in the implementation of artificial intelligence and ML in their financial business, particularly fintech. According to the research, 23% of the job market in finance will be different by 2027, with AI and ML playing a critical role in boosting efficiency and automating processes. Following are some examples of Mortgage applications using Artificial Intelligence (AI) and Machine Learning (ML) [8]

## 2.1 Pattern Detection for Aml and Fraudulent

AML explains as a collection of practices, laws, or rules intended to put an end to the practise of making money through shady means. Many financial institutes utilize AI based systems. Such systems offer more resistant and knowledgeable about AML trends. The accuracy and speed of various devices are anticipated to increase as a result of continuous developments in AI. Actually, numerous countries now recognise the value of DL and AI in detecting fraud. The National Stock Exchange of India is one such example. It has declared that it will prevent High Frequency Trading (HFT) insider trading by establishing systems in place which should enable the DL to identify market tendencies and to keep an eye on the exchange. To improve overall protection, they intend to revamp existing tracking system with AI and ML.

## 2.2 Personalized Banking and Automation

This could be one of the placeholder where artificial intelligence has really excelled, with its innovations and techniques for granting users of banking an easier access and level of comfort. Notably, AI is revolutionizing the Mortgage Industry by providing clients with personalised services like chatbots that offer self-help answers, which lighten the pressure on call centres. Voice-controlled virtual assistants today provide clients smarter services for any transactions they are conducting. Including balancing accounts, setting up payments, tracking transaction history, and much more. In furthermore, various applications exist on the market now that provide specialized financial advice. We now have an AI application system that keeps track of our income, expenses, and spending patterns and makes recommendations for an optimum budget and financial advice. It makes sense that business leaders are increasingly promoting robotic process automation as a component of their long-term strategies to save costs and increase productivity through intelligent character recognition. The mortgage sector can reduce human error in routine, often occurring procedures by implementing AI and ML

Personalized banking and automation are two key pillars reshaping the financial industry, including the banking sector. They revolve around utilizing technology to cater to individual customer needs and streamlining banking operations for efficiency.

Personalized banking leverages customer data to create tailored experiences, while automation optimized banking processes for efficiency and accuracy. By combining both approaches, financial institutions can offer enhanced customer satisfaction, improve operational efficiency, manage risks effectively, and remain competitive in the ever-evolving landscape of modern banking.

## 2.3 Customer Recommendations

Recommendation engines in the Mortgage industry have also benefited greatly from computational intelligence. It makes the finest customer assessment using historical user data according to the customer's request and behavioural patterns. There are suggestion engines which have contributed significantly to the income growth that many institutions have seen from the dawn of time. ML enables lenders to understand individual customer needs and preferences better, ultimately enhancing customer satisfaction and increasing the likelihood of successful in the mortgage sector.

**Tailored Loan Offerings:** ML algorithms analyze customer data to recommend mortgage products that align with the specific financial situation, preferences, and risk profile of individual borrowers. Based on the historical data and borrower characteristics, ML models

can suggest interest rates and loan terms tailored to meet the customer's financial goals and capabilities.

**Enhanced Interaction:** ML-driven chatbots or virtual assistants engage with customers, guiding them through the mortgage application process, addressing inquiries promptly, and offering personalized advice and assistance.

By employing ML technologies in customer recommendation processes, mortgage lenders can offer more personalized, transparent, and customer-centric experiences. These recommendations are not only tailored to individual needs but also contribute to a more efficient and satisfying mortgage application and approval process for borrowers.

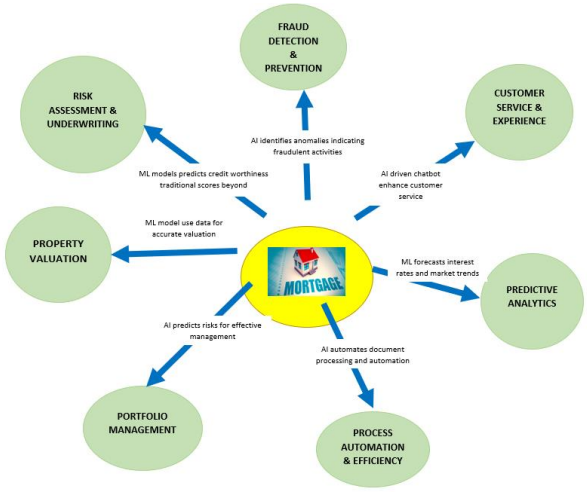


Figure 1-Role of ML & DL in Mortgage Industry

## 2.4 Risk Management

Considering the prior data is the key of the fundamental principles of AI and ML 'Machine Learning' and 'Deep Learning' are so naturally capturing the Mortgage industry, where bookkeeping and recordkeeping are second nature. for instance, the operation of credit cards. We've been using credit rating to evaluate who can obtain credit cards and whoever hasn't been around for quite a long period of time. This method, nevertheless, divides individuals into "haves" and "have nots," which is bad for business. Instead, the Mortgage industry can gather information about each person's loan repayment patterns, the quantity of mortgage credit they are now servicing, how many credit cards they have, and other things.

This information may be used by the organization issuing the card to tailor the interest rate in a manner that pays logical when they provide it.. That's when ML and DL come into play.; Imagine a technology that could analyze thousands of individual financial records to find a solution. The institution issuing the card could use this information to tailor the interest rate which makes sense to implement. Imagine a device that could examine hundreds of distinct financial records in order to draw a conclusion. This is exactly AI and DL come into play. Deep Learning could evaluate thousands of data points and provide loan and credit offerings because it is a data-driven and data-dependent colossus. [9]

Risk management in the mortgage industry is crucial for lenders to assess and mitigate potential financial risks associated with lending. Machine learning (ML) plays a pivotal role in enhancing risk management practices. ML is utilized for risk management in the mortgage sector for Credit Risk Assessment, Fraud Detection and Prevention, Portfolio Risk Management, Automated Underwriting, Market Risk Prediction, Improved Decision-Making, Continuous Learning and Adaptability. Generally ML algorithms and predictive models empower mortgage lenders to make informed decisions, identify potential risks, prevent fraud, streamline processes, and ultimately manage risks more effectively in the complex landscape of mortgage lending. These technologies significantly contribute to improving risk management practices in the mortgage industry.

## 2.5 Predictive Analysis

ML model forecast interest rate changes by analyzing various economic indicators, helping lenders and making informed decisions and adjust pricing strategies. ML algorithms also used to analyze real estate data, economic indicators, and market trends to predict property values, housing market shifts, and foreclosure risks.

## 2.6 Portfolio Management

ML models aid in assessing and managing risks associated with mortgage portfolios. These models predict potential risks, including defaults, prepayment rates, market fluctuations, and changes in property values, enabling proactive risk mitigation strategies.

Figure 1 represents to visually depict how AI and ML are intertwined across various facets of the mortgage industry, showcasing their widespread application and impact.

# 3. Conclusion

Automation and DL techniques are revolutionizing the Mortgage Industry. Therefore, it appears that no one can do anything to prevent this. These two forms of computer intelligence are helping to handle things appropriately. The Mortgage industry now has a new approach to satisfy the fundamental necessity of their Borrows and Lenders. Lenders and borrowers both desire simpler, more convenient, and secure ways to use, preserve, consume, and borrow money. The Mortgage Industry must therefore answer the demand of the modern age. Modern consumers are intelligent people. They've come to understand that technology is neither expensive or difficult to acquire; all of it is included on a smart device that a regular man can use with ease.

In summary, ML and DL technologies play a pivotal role in enhancing efficiency, accuracy, risk management,

and customer experience within the mortgage industry. These technologies enable lenders to make data-driven decisions, streamline processes, mitigate risks, and ultimately provide better services to borrowers.

## Acknowledgement

Under the supervision of Dr. Kirubanand V.B. Assistant Professor, as a part of Computer Science Department, Christ (Deemed to be University),

## *References*

[1] P. K. Donepudi, "Influence of Cloud Computing in Business : Are They Robust ?," Asian Journal of Applied Science and Engineering, vol. 5, no. 3, pp. 193–196, 2016, [Online]. Available: https://zenodo.org/record/4110309#.YKfMRy8RpPM.

[2] S. Das, A. Dey, A. Pal, and N. Roy, "Applications of Artificial Intelligence in Machine Learning: Review and Prospect," International Journal of Computer Applications, vol. 115, no. 9, pp. 31–41, 2015, doi: 10.5120/20182-2402.

[3] S. Kumar and C. D., "A Survey on Customer Churn Prediction using Machine Learning Techniques," International Journal of Computer Applications, vol. 154, no. 10, pp. 13–16, 2016, doi: 10.5120/ijca2016912237.

[4] A. L. Samuel, "Some Studies in Machine Learning Using the Game of Checkers," IBM Journal of Research and Development, vol. 3, no. 3, pp. 210–229, 1959, doi: 10.1147/rd.33.0210.

[5] S. Ahmed and S. Hossain, "Asian Business Consortium | EI Page 20," vol. 2, no. 1, pp. 20–28, 2014.

[6] S. W. Bauguess, "Speech Has Big Data Made Us Lazy ? Deputy Director and Deputy Chief Economist , DERA What Is Big Data ? How Big Data Is Shaping Analytical Methods," 2016.

[7] S. AlSheibani, Y. Cheung, and C. Messom, "Artificial intelligence adoption: AI-readiness at firm-level," Proceedings of the 22nd Pacific Asia Conference on Information Systems - Opportunities and Challenges for the Digitized Society: Are We Ready?, PACIS 2018, 2018.

[8] L. Yu, Z. Yang, and L. Tang, "A novel multistage deep belief network based extreme learning machine ensemble learning paradigm for credit risk assessment," Flexible Services and Manufacturing Journal, vol. 28, no. 4, pp. 576–592, 2016, doi: 10.1007/s10696-015-9226-2.

[9] S. W. Bauguess, "The Role of Big Data, Machine Learning, and AI in Assessing Risks: A Regulatory Perspective," SSRN Electronic Journal, 2018, doi: 10.2139/ssrn.3226514.