

ROLE OF MACHINE LEARNING IN ALLEVIATING FINANCIAL RISK

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Abstract:

In every aspect of our day-to-day lives, machine learning techniques interact with each other and have a growing impact on our behaviors. Machine learning algorithms are used in the financial sector to detect fraud, facilitate high frequency trading, and provide stakeholders with financial consulting services. Hence becoming extensively designed, ML is able to rapidly review millions of large datasets in order to enhance the outcomes. ML tends to be more effective when massive amounts of information are included into the program, when deriving findings and predicting the future. Implementations for financial risk management can benefit from machine learning, but the approach should be appropriate for the issue at hand and the data at hand. Furthermore, the application of machine learning methods in the field of financial services depends heavily on the environment. In the finance industry, machine learning is frequently viewed as a method that could provide that analytical power. In addition, ML can be employed for many activities that are thought to be above human capacity.

Index terms:

Machine learning, financial systemic risk, Risk analysis, Algorithmic accountability, Personal data, Risk-based inspection, Risk assessment, Fraud.

Introduction:

Machine learning techniques have just begun to have an impact on all aspects of our life, encompassing laws and order, business, entertainment, economics, human resources management, communications, infrastructure, and charitable work. An area of artificial intelligence called machine learning focuses on creating interfaces that can independently examine sources of information and modify their parameters to optimize consumer experience. Applications for financial risk management can benefit from machine learning, but the strategy should be appropriate for the issue at hand and the data at hand. The market volatility in financial markets and industries has thus been detected and identified using a variety of machine learning techniques. There is currently no study that covers the use of ML approaches in the issue of RBI evaluation, despite huge efforts to do so in the inspections and diagnostics areas [1]. Consequently, it is highly advised to apply machine learning techniques created especially for data that is uneven. Significant exclusions or misleading statements arising from a deliberate not disclosing financial data in accordance with generally accepted accounting procedures are considered financial reporting fraud [2].

Due to the complicated nature of financial markets, unpredictable market behaviour, and potential appearance of rare events that can diminish any generalisation or structure discovered on companions, as demonstrated by the strengths and weaknesses of the models observed, machine learning methods are still far away from being the best options for financial forecasting [3]. However, mutual ML makes it more difficult and time-consuming to manage the changing manufacturing processes in real-time [4]. Machine learning is intimately linked to the "big data revolution" because it depends on massive datasets and powerful computing" [5].

Prior research on the possibilities of machine learning to enhance the risk analysis in credit risk-related activities has taken a computer science methodology, emphasising the development and testing of programs [6]. On the contrary side, machine learning typically entails human judgments towards the use of the corresponding output data, in addition to the data academic's qualitative categorization and verification [7]. Predictive methods and machine learning powered by artificial intelligence (AI) technologies will offer sales projections in certain markets as well as efficient provision and resource optimization as they support forecasting revenue and determining the necessary amounts of a specific element [8].



Fig.1. Machine learning technology used in finance

The main applications of AI-based technologies, as identified by 84 percent of leading financial people in our recent poll, is machine learning for managing risk. Recent advancements in big data and machine learning-based financing reflect improvements in the evaluation of credit risk. The greater utilisation of information combined with new technologies like machine learning could assist raise estimation accuracy [9]. “Machine learning is becoming an essential component of the future generations of time series prediction models due to the increased accessibility of data and computer power in recent years” [10].

Literature review:

Martin Leo et.al 2019 evaluated by Financial risk management still has a wide range of applications that might benefit substantially from study into the application of machine learning to address specific problems. ML, one of the cutting-edge techniques with significant implications for risk management, can enable the development of many more appropriate risk simulations by identifying complex patterns, different from the conventional in vast datasets. In the financial services industry, machine learning is frequently thought to have the possibility to provide predictive capabilities. Although the most well studied and assessed risk category for the use of machine learning is credit risk, this phenomena is not recent [11][3].

Gang Kou et.al 2019 explained by the significance of systemic risk to economies and financial systems cannot be overstated. The present management of the financial sector and market is improved by machine learning techniques, which investigate the causes of systemic risk outbreaks and transmission in the financial network. Moreover, systematic risk is constantly a possibility in contemporary large-scale financial systems, making smart and fully automated machine learning methodologies an important tool to evaluate and identify systemic risk from big data of financial transactions, industry personal views along with risk predilection, etc. [12][4].

Ahmet Murat et.al 2020 presented by One of the most researched domains for ML applications has consistently been financial. There are several ML studies and books with a broad perspective that don't focus on any specific implementation areas. In the area of finance, machine learning's predictive capabilities are being used more and more. Additionally, we will want effective, precise, parallel programming methods that reduce the amount of develop financial for implementations in machine learning [13][5].

Akib Mashrur et.al 2020 described by “Machine learning is a valuable source for emerging technologies and methods because the task significantly relies on information-driven making decisions”. ML algorithms are used by financial systems for fraud detection to separate fake financial data from extremely huge amounts of data. The availability of good training data is crucial to machine learning's effectiveness. Truly representative learning is the foundation of many machine learning techniques used in finance, although outside flaws can cause credit score or insurer pricing schemes to acquire potentially biased interpretations. The prediction of credit card default has recently seen widespread use of machine learning algorithms [14][15][16].

Dan Guest et.al 2018 demonstrated by for many years, machine learning has been crucial in the process of processing high energies quantum mechanics data. These jobs cannot be fully automated, despite the occasionally excellent performance that ML models can attain in them. Understanding how support from machine learning methods impacts human performances and individual action is crucial to exploring the benefits of ML for enhancing human decision-making. In a broad range of jobs, machine learning has shown tremendous results. Financial fraud can appear in a variety of contexts, including banking, insurance, and investments . Both offline and online options are possible. Meanwhile, recent advances in Deep Learning (DL) techniques have produced potent methods that commonly exceed traditional machine learning algorithms in problems relating to the electrical domain and can manage enormous data sources [17][18][19].

Methodology:

Additionally, techniques like machine learning and artificial intelligence can use every variable in a data collection without assuming that any of them have any relationships or have any predictive potential [20].

How Finance Uses Machine Learning:

A few illustrations of how machine learning is used in finance are:

Algorithmic trading:

Algorithmic trading is the process through using programs to enhance financial decision. ML’s quick trading recommendations create human operators above the market norm. The primary

users of the trading method to automate speculative trading are executives of institutional investors and financial firms.

Fraud detection and prevention:

Fraud is a significant problem for financial institutions and other content providers that causes economic loss in the millions of dollars. Many financial organisations keep its information online, which increases the risk of a security issue. In the past, fraud prevention systems were created using a set of criteria that modern thieves could easily ignore. Machine learning finds anomalous behaviour in massive data sets and flags it for further investigation by security specialists.

Portfolio management (Robo-advisors):

Machine learning-based internet applications called robo-advisors provide individuals with automated financial advice. Using algorithms, the software builds a financial portfolio depending on the investor's goals and risk perception. Robo-advisors are associated with reduced accounts minimum standards and significant cost reductions over conventional financial advisers.

Loan underwriting:

Millions of customer datasets are available to insurance and financial services companies, which may be used to educate algorithms using machine learning and speed up the underwriting process. “Organizations can save both money and time by using machine learning algorithms to quickly determine on underwriting and credit scoring instead of hiring human decision-makers”.

Why finance should consider machine learning?

Despite the difficulties, numerous financial institutions currently use this technology. The graph below demonstrates how seriously financial industry executives take machine learning, and for a variety of good reasons:

- Lower operating expenses as a result of process automation.
- Higher revenues as a result of improved efficiency and user experiences.
- Improved adherence and strengthened security.

Comparative analysis:

The finance sector is utilising machine learning increasingly in order to create models that are accurate and quick. Machine learning, a component of AI, enhances the customer experience while enabling firms to employ fewer people overall. The financial services sector is seeing major advancements in machine learning. Machine learning programmes take advantage of their mistakes without having to state it outright coded, which is what makes them so magical. This is mostly due to the fact that machine learning algorithms frequently outperform econometric and statistical models in terms of precision because they do not rely on any data assumptions [21].

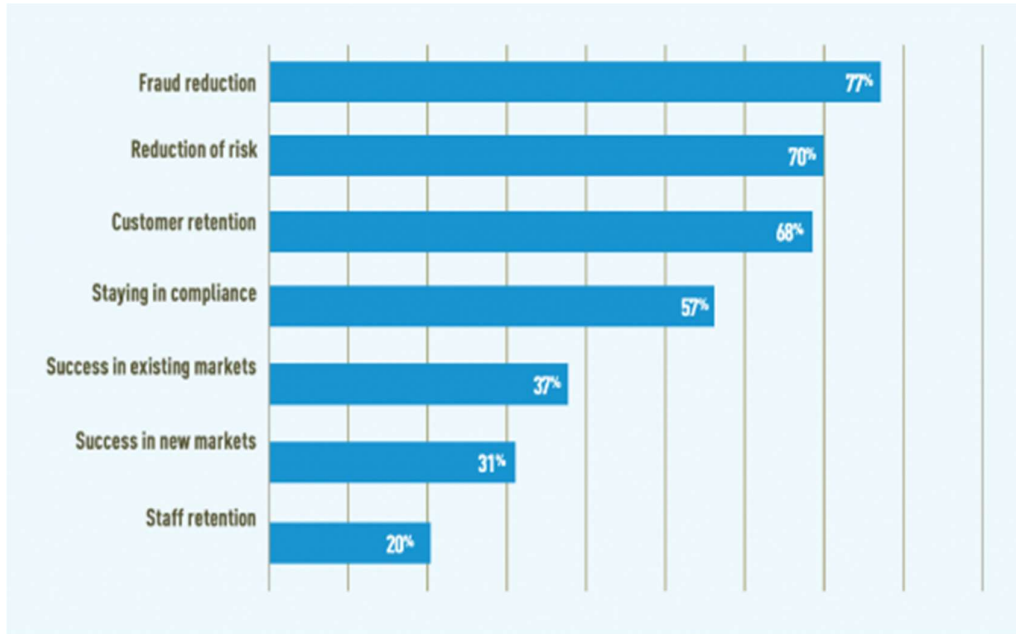


Fig.1 Machine learning in finance is rapidly developing

Conclusion:

Numerous leading financial technology and financial services providers are already implementing machine learning into their everyday activities that has enhanced efficiency, reduced risk, and enhanced portfolio management. Operational risk is also being reduced through the use of machine learning, which helps asset managers and hedge funds spot flaws and enhance decision-making. The well-researched fields include fraud detection, credit rating, bankruptcy prediction, and volatility forecasting. The financial services and banking sector is generally considered to have a promising future for machine learning, and it is projected that risk assessment will also attempt to apply machine learning techniques to enhance their abilities.

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