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Examining the Use of AI and Machine Learning in the Banking Industry: A Methodical Literature Review

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Abstract: *In numerous industries, machine learning techniques are being implemented to improve performance. Typically, their purpose is to facilitate prediction in order to enable the organization to implement the required actions. The various benefits and advantages of artificial intelligence and machine learning techniques are examined in this article. This literature review examines the contributions of various researchers in order to demonstrate the significance of artificial intelligence in the financial industry. The potential utility of machine learning techniques within the financial industry, particularly in the credit assessment process, is also addressed.*

Keywords: Artificial Intelligence, Machine Learning Methods

I. INTRODUCTION

Intelligent artificial systems are the most critical subfield of computer science. The primary objective of artificial intelligence is to diminish the level of human exertion required to execute various duties. These may represent duties in various disciplines. The workload that traditionally requires human labor is steadily escalating, which is precisely why artificial intelligence is necessary. Artificial intelligence trains machines or systems to think and act in a manner resembling that of a human through the use of machine learning (Beetz, Buss, & Wollherr, 2007). Banks play a significant role in the economic landscape of a nation. Consequently, the bank's performance is significant to a multitude of stakeholders, including investors, customers, and the general public, among others.

The amount of labor that must be completed is growing as time passes. Obtaining every piece of work completed by a human being is a challenging and time-intensive endeavor. A human being is incapable of accomplishing the task at the same rate that a machine can. Additionally, the task could be executed incorrectly by a human being. As a result, expert systems equipped with artificial intelligence are necessary. An expert system is defined as a machine that surpasses the capabilities of a human in task execution (Horvitz, Breese, & Henrion, 1988). These systems may be implemented in banking institutions to automate duties or solve problems. Failure of banks can be attributed to the absence of work-load reduction systems. Another contributing factor to the financial losses in the banking industry is the absence of predictive techniques.

Upon examining several papers for this literature review, it is determined that institutions must implement AI and ML in order to improve their operations. It is recommended that banks implement this technology in order to remain informed about the most recent developments in the IT sector (Jakšić & Marinč, 2019). In their 2015 article, More, Cortez, and Rita suggested that banks implement intelligence systems to assist managers with decision-making.

This paper will examine how artificial intelligence (AI) and machine learning (ML) can be implemented to address various problems in the financial industry. This review of the literature will discuss the significance of AI in the financial industry for resolving various issues.

The methodology is expounded upon in Section 2, while the research questions are formulated in Section 3. The search process is detailed in Section 4. The results and discussion are presented in Section 5. Finally, the conclusion is provided in Section 6.

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II. METHODOLOGY

The approach employed to evaluate the various research papers is a systematic review of the literature. The search returned twenty papers as per the query string.

Inclusion and Exclusion

The papers underwent additional analysis in preparation for their inclusion in this literature review. In this literature review, only journal articles that were published in the English language are considered. A total of ten journal articles were deemed pertinent to our inquiry and have been incorporated into this literature review.

Quality Assessment

This literature review is founded upon ten papers, as the research conducted in those papers pertains to the subject matter under consideration. These scholarly articles demonstrate the banks' recognition of the significance of artificial intelligence and machine learning.

Research Question

Research questions constitute a critical component of a literature review. This literature review will provide responses to the two research queries necessary to comprehend the effort. The subsequent inquiries constitute the research queries.
RQ1: What are the different uses of AI in the banking sector?
RQ2: What is Credit Scoring and how machine learning techniques can be used for this purpose?

Search Process

A selection of scholarly articles is gathered from renowned databases such as Elsevier and IEEE Xplore, among others. The papers that are pertinent to the discourse of this literature review are subsequently finalized.
During the initial stage, papers were omitted on the grounds of their titles and abstracts. Then, during the second phase, papers were eliminated based on a review of their text and conclusion.

III. RESULT AND DISCUSSION

Numerous scholarly articles have been released to demonstrate the significance of machine learning and artificial intelligence in the finance industry. The authors of (Casabianca, Catalano, Forni, Giarda, & Passeri, 2019) put forth a proposal for an early warning system with the capability of forecasting impending crises. The foundation of this early warning system is machine learning algorithms, which were determined to be the most suitable for prediction purposes by the researcher. Machine learning algorithms undergo initial training using a training dataset, after which they execute distinct actions in accordance with the knowledge gained.
RQ 1: What are the different uses of AI in banking sector?
Artificial intelligence has the potential to serve various objectives within the financial industry. Thus, banking has become more streamlined and effective. Several significant applications of AI in the financial industry include the following.
As a result of artificial intelligence, banking is now resistant to deception. As online payment acceptance and usage increased, so did the number of cybercriminals committing online fraud. Transactions are subject to monitoring by AI algorithms, which impede them if they detect any potential hazards (Kaya, Schildbach, AG, & Schneider, 2019). By comparing the quantity and location of a current transaction to those of a preceding transaction, an AI algorithm detects fraudulent activity.
AI is of great assistance to the bank when it comes to managing customers via chatbots. Chatbots are a type of digital assistant that engage in verbal or textual exchanges with consumer inquiries. This exchange takes place in the absence of a bank representative. Chatbots acquire knowledge from customer behavior and generate recommendations or execute actions in response (Agarwal, Agarwal, & Talib, 2019). Chatbots facilitate the provision of prompt consumer responses.
By leveraging artificial intelligence, maintaining accurate and up-to-date records is a straightforward task. The possibility of human error or the insertion of inaccurate data is eliminated.

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Security hazards can be identified by artificial intelligence systems with the assistance of machine learning algorithms (Alzaidi & Security, 2018). Additionally, they are capable of carrying out any action deemed necessary in response to a security threat.

An advanced artificial intelligence-based face recognition system may be implemented at ATMs to detect and prevent fraud (Sindhu & Namratha, 2019).

RQ 2: What is Credit Scoring and how machine learning techniques can be used for this purpose?

Credit assessment is the procedure by which the likelihood that a consumer will be able to pay is determined. A significant issue within the financial industry pertains to the provision of funds to consumers who are unable to reimburse the borrowed funds. It is possible to predict whether or not a client will be able to repay the loan using machine learning techniques. The customer may be eligible to receive the credit in accordance with this forecast (Boughaci, Alkhawaldeh, & Analysis, 2020). For this purpose, various variables may be employed, including guarantees and historical payments. According to researchers (Steenackers, Goovaerts, & Economics, 1989), the conventional approach to loan decision-making is both labor-intensive and prone to error. Conventionally, a specialized individual makes the determination regarding whether or not to grant a loan to an individual. However, machine learning techniques have simplified this process of decision making. A variety of machine learning methodologies may be employed in this procedure.

Table 1: Machine learning techniques for Credit Scoring

Random Forest	**Logistic classifier**
k-Nearest Neighbor classifier	Support Vector Machine
Naive Bayes classifier	Bagging
Bayes Network classifier	AdaBoost
OneR	Logit Boost

According to the authors of (Boughaci et al., 2020), machine learning techniques can assist the bank in identifying qualified candidates. In essence, they have implemented various machine learning techniques, each of which produces unique outcomes when applied to a unique set of data. Researchers discovered in (Van Gestel, Baesens, Garcia, & Van Dijcke, 2003) that the SVM yields superior credit scoring outcomes. Similarly, the authors of (Auria & Moro, 2008) determined that SVM is the most effective method for credit scoring. In their study, Baesens et al. (2003) applied various machine learning methodologies to a collection of eight credit scoring data sets. They discovered that the performance of the neural network classifier and LS-SVM is satisfactory. The performance is evaluated utilizing the criterion of accuracy.

IV. CONCLUSION

The authors of (Boughaci et al., 2020) state that the bank can benefit from the assistance of machine learning techniques in identifying qualified candidates. Fundamentally, they have integrated an assortment of machine learning methodologies, each of which yields distinct results when applied to a distinct collection of data. It was found by Van Gestel, Baesens, Garcia, and Van Dijcke (2003) that the SVM produces enhanced results in credit scoring. In line with this, the authors of (Auria & Moro, 2008) concluded that SVM is the most efficient credit scoring method. Baesens et al. (2003) conducted a study wherein they utilized a variety of machine learning methodologies to analyze eight distinct credit scoring data sets. It was determined that the neural network classifier and LS-SVM exhibit satisfactory performance. The assessment of performance is conducted by applying the criterion of accuracy.

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