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A Literature Review on Risk management and Fraudulent Transactions in Banking Sector using various Artificial Intelligence and Machine Learning Techniques

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1. Abstract:

Banking sector marks a huge impact on the economy of the country. In the past few years, the implementation of **Artificial Intelligence** is validated in banking industry. Business applications are being influenced by Artificial Intelligence and Machine Learning. In this the key issues are explored which directs to various ways for future research. The area of risk management which was not fully analysed was the scope for future research. We analyse the algorithms of Machine Learning that supports in different regions of banking, such as Decision Tree, K-Means, Naïve bayes Support Vector Machines and Neural Networks that functions in risk management.

Keywords: Artificial Intelligence, Machine Learning, Banking risk management.

2. Introduction:

Artificial Intelligence & Machine Learning:

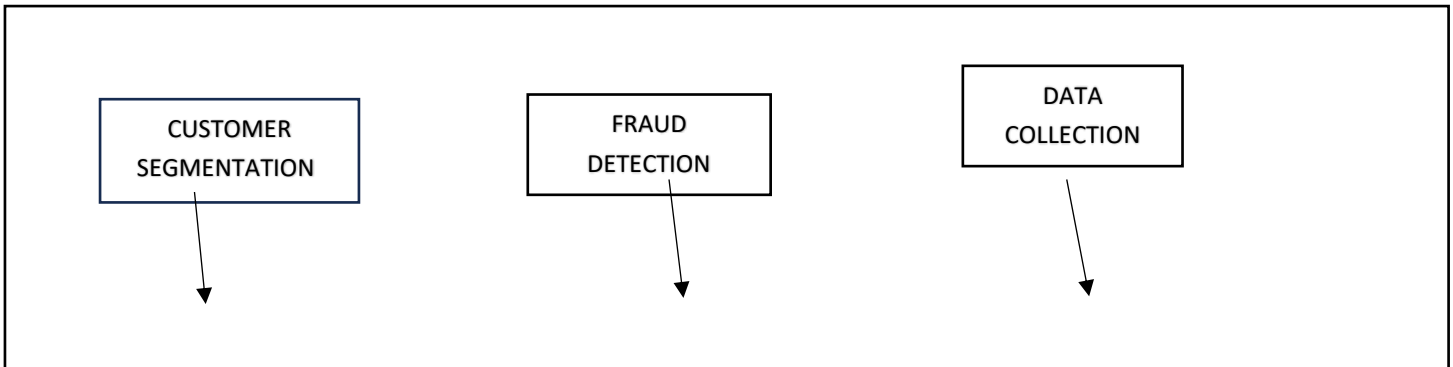
Artificial intelligence uses different techniques in different areas. The ability of human thinking such as reasoning, learning, interacting with the environment, exercising creativity, perceiving, and problem-solving. It remembers complicated interrelated facts and draw conclusions from them and also plan sequences of actions to complete a goal and offers advice based on rules and situations. AI was coined in the year John MCartthy in the year 1956.

Arthur Samuel, an early American leader in the field of computer gaming and artificial intelligence, coined the term “Machine Learning” in 1959 while at IBM. ML is a subcategory of AI. The machine will get trained. The trained machine with applies algorithms for performing data analysis. Decisions are made from the learning experience.

Algorithm	Areas of banking sector.	Description
Decision Trees	Analysing Transactions	To detect fraud transactions by analysing patterns and attributes. It can identify suspicious transactions. Decision trees plays a vital role in banking transactions such as credit history, income and loan applications.
K-means	Classifying Customers	Customers can be classified based on their income, minimum balance maintenance, transaction history and credit history.
Naïve Bayes	Coll ecting data	This algorithm is relevant for collection of customer's data, transaction history, credit scores and some more. It helps in predicting credit risk and fraud detection or loan approval from the historical data.

Support Vector Machines	Classification	The data is segregated into high-risk and low-risk customers, fraudulent and non-fraudulent transactions. It focuses on maximising the margin between the classes and minimising the errors of classification. The trained support vector machine model is trained in such a way that it classifies new date into risk categories.
Random forest	Anomaly Detection	It does all the activities done by other algorithms in banking sector. Identifies unusual behaviour of the customer or irregular patterns in financial transactions.
Neural Networks	Prediction	As the remaining algorithms Neural Networks analyses the customer credit history. It helps in fraud detection and also identifies money laundering by recognising patterns. Neural networks helps in prediction of the stock prices, interest rates in the market .

Figure: Risk Management of different applications using various algorithms.



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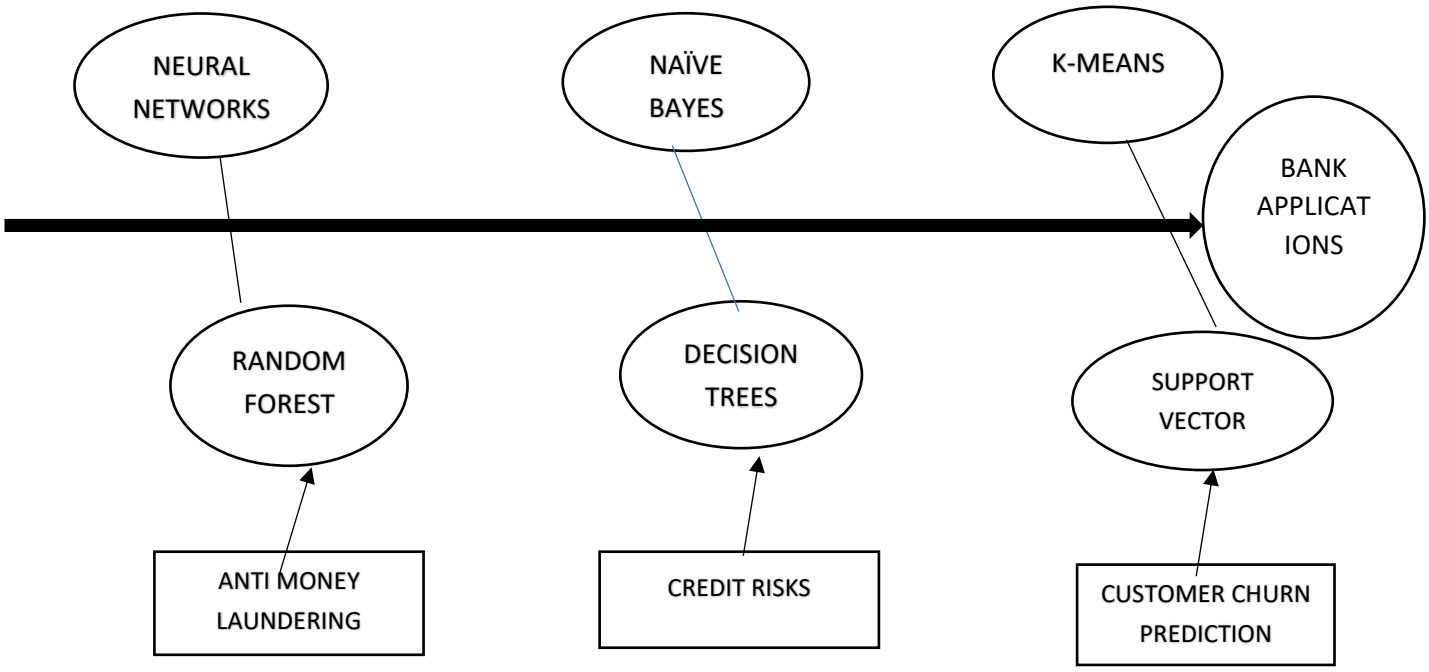

Analysing various algorithms determines the risk management areas in banking sector such as credit risks, income, loan approvals, market analysis, customer churn prediction, fraud detection. The algorithms such as decision trees and K-Means are good at analysing and classifying the customer. Naïve bayes and Support vector machines helps in collection of data and identifying the risk by past results. The other algorithms and Neural Networks help in Anti-Money Laundering, customer churn prediction and other.

AML and Fraud Pattern Detection

Anti-Money Laundering (AML) leads to procedures, laws, or regulations. These are subjected to stop the generation of income through illegal activities. For these kind of activities banks are using A.I. based systems, which are more robust and intelligent to the AML patterns. With continuous innovations and improvements in the field of A.I., these systems are set to become more accurate and faster. Actually, many countries are now embracing the power of A.I. and ML in fraud detection. A notable example is the National Stock Exchange of India, which recently announced that they are putting in place policies to pave the way for utilizing machine learning to identify market patterns,

monitoring on the exchange to prevent manipulation of its Frequency Trading (HFT) markets. Still on upgrading their surveillance system with A.I. and ML to strengthen their security.

Customer recommendations

Computational intelligence has also rendered an essential contribution to recommendation engines in the banking sector. It is based on using data from the past about users to make the most appropriate user recommendation based on their preferences and the user's history. Since time immemorial, recommendation engines have played a major role in revenue growth enjoyed by many banks. Gather relevant data: Collect historical customer data, including transaction history, account activity, customer demographics, and any other relevant features.

Handle missing data: Impute or remove missing values in the dataset.

Feature engineering: Create new features that may be indicative of potential churn, such as average transaction amount, frequency of transactions, customer tenure, etc.

Risk Management

The building tenets of A.I. and ML are learning from past data. Therefore, it is natural that ML and A.I. are sweeping over the banking sector, where bookkeeping and records are their second name. For instance, how credit cards work. For far too long, we've used credit score as a means of deciding who qualifies for a credit card and who does not. However, this technique classifies people into 'haves' and 'have nots', which is not good for business. Instead, what the banking sector can do is collect data about each individual's loan repayment habits, the number of loans he/she is currently servicing, how many credit cards he/she has, and so on. and markets. In this we analysed the problems which were Identified in risk management.

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CUSTOMER CHURN PREDICTION:

Choose a suitable ML model for churn prediction. Common models include logistic regression, decision trees, random forests, support vector machines, and neural networks. Experiment with different algorithms to find the most effective one.

3. Literature Review:

To determine the risks specific to banks, as an alternate to leveraging on existing literature an analysis of the available literature was carried out to evaluate the areas of banking risk management where machine-learning techniques have been researched. The research evaluated the risk areas where machine learning has been implemented in the risk types and the specific risk methodology they addressed. The analysis also identified the machine learning algorithms being used, both for specific areas and in general. The problem is to identify the best classification algorithm for various business applications, such as credit forecasting, bankruptcy forecasting, and credit card fraud detection.

In this paper the performance of the various Machine Learning algorithms is analysed in various risk factors at banking sector. In a research of Martin Leo[1] the context of risk management within the banking sector was assessed and evaluated various Machine Learning techniques.

Drivers of Artificial Intelligence in Banking Service Sectors Mohamed Hussain Thowfeek1y [2] . In this study, the drivers and barriers to successful AI implementation in the banking sector is analyzed using a panel data of 28 semi-structured interviews with AI experts in the field of banking and finance.

Analysing the initial results of an industrial open innovation project in the banking sector proposing a general roadmap for fairness in ML and the implementation of a toolkit called BeFair that helps to identify and mitigate bia.[3]

Classification algorithms such as supervised, unsupervised and Reinforcement algorithms in various banking applications were analysed by Linwei Hu[4] . These algorithms are emphasised in automating many of the steps in model building. The idea is to define recommendations which could be helpful for different types of banks.

Customer satisfaction and frustration with online banking have been predicted using Machine Learning techniques in this study is given by Syeda Farjana Shetu [5]. Here A survey of various customers satisfaction and frustration is analysed by using various Machine Learning techniques.

The study of a holistic and systematic review of the literature on the utilization of artifcial intelligence (AI) in the banking sector since 2005 was given by Omar H. Fares [6] .

Prospects of Artificial Intelligence and Machine Learning Application in Banking Risk Management it is about new financial technologies and digital banking are changing the financial world, risk management follows those trends.

Machine learning techniques for credit risk evaluation: a systematic literature review In this survey paper, a systematic literature review is performed on existing research methods and ML techniques for credit risk evaluation by Siddharth Bhatore1 [7] . In this a study of multiple challenges were evaluated in the field of credit risk. A model differs from area of the banks with its own risk and challenges.

4.Conclusion:

Since few areas banking sector has focussed on AI and ML technologies revolutionizing various facets of banking operations and business applications. The influence of AI and ML in the banking industry, emphasizing the need for continued exploration and research, particularly in the realm of risk management and fraudulent transactions.

While considerable strides have been made in leveraging AI and ML algorithms such as Decision Trees, K-Means, Naïve Bayes, Support Vector Machines, and Neural Networks to enhance risk management practices, there remains ample scope for future investigation. By delving deeper into these algorithms and their applicability across different banking domains, researchers can unearth novel insights and strategies to mitigate risks effectively.

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