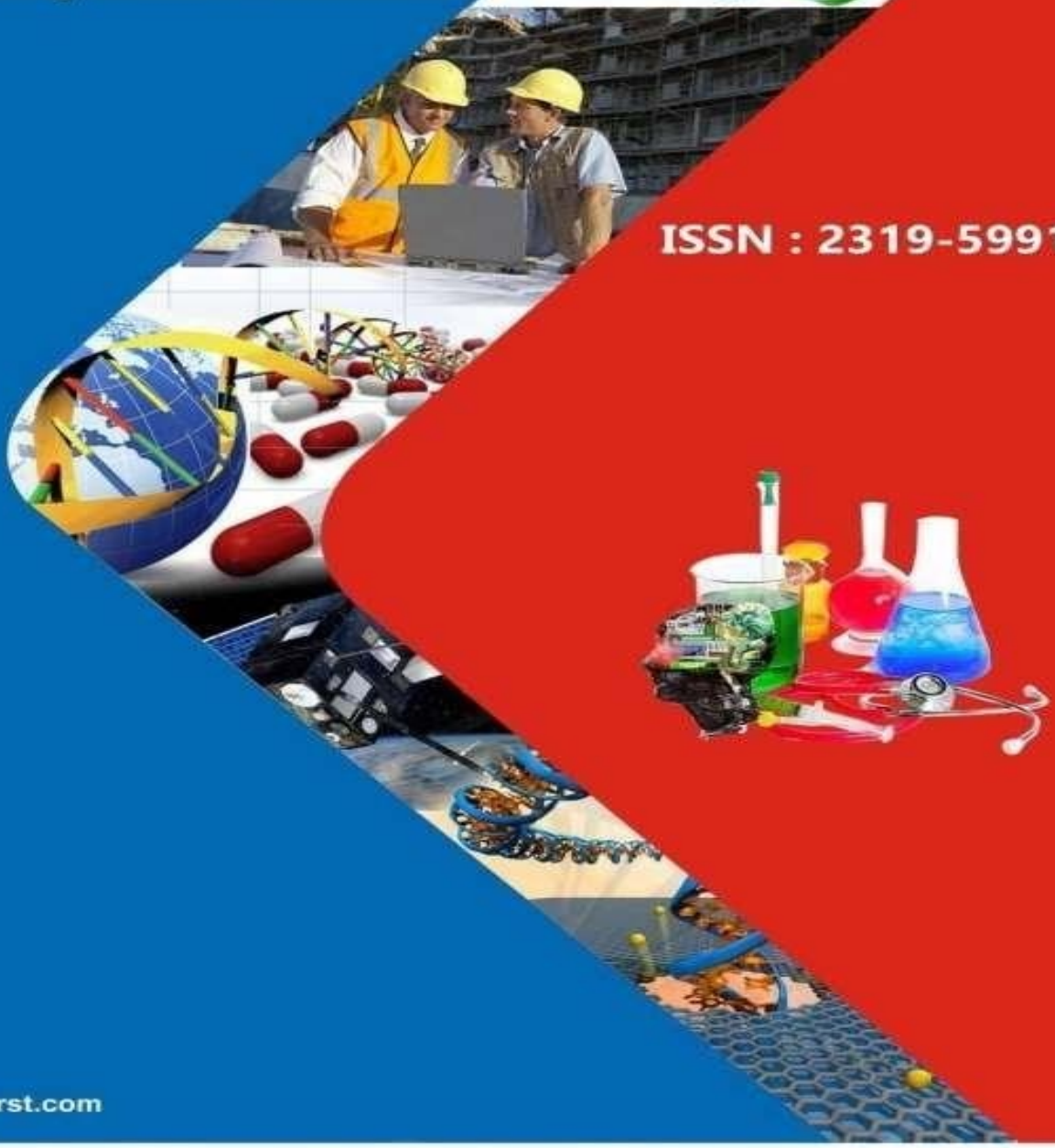
International Journal of Engineering Research and Science & Technology

IJERST



ISSN : 2319-5991

www.ijerst.com

Email: editor@ijerst.com or editor.ijerst@gmail.com

International Journal of Engineering Research and Science & Technology

ISSN 2319-5991 www.ijerst.com

Vol. 21, Issue 2, 2025

FRAUD DETECTION IN BANKING DATA BY MACHINE LEARNING TECHNIQUES

[1]Mrs. Y. Lakshmi Durga Asst.Professor, [2]K. Samatha, [3]Sk. Muskan, [4]K. Jaya Shri,[5] A. Jahnavi, [6]P. Lakshmi Bhavani

EMAIL: lakshmisri.3124@gmail.com

Vijaya Institute of Technology for Women

(Affiliated to J.N.T.U Kakinada, Approved by A.I.C.T.E, New Delhi)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

ABSTRACT

Fraud detection in banking has become a critical concern due to the increasing number of fraudulent activities affecting financial institutions and customers. Machine learning techniques offer an effective approach to identifying and preventing fraud by analyzing large volumes of transactional data and detecting suspicious patterns. Traditional rule-based fraud detection methods are often limited in adaptability and fail to recognize new and evolving fraudulent behaviors. Machine learning models, such as decision trees, support vector machines, neural networks, and ensemble methods, can enhance fraud detection by learning from historical data and identifying anomalies in real-time transactions.

1. INTRODUCTION

Fraud detection in banking has become one of the most pressing concerns for financial institutions worldwide. The rapid increase in digital transactions and online banking services has led to a surge in fraudulent activities, making it imperative for banks to adopt robust security mechanisms. Traditional fraud detection methods rely on predefined rules and human intervention, which often fail to detect sophisticated fraudulent behaviors. With advancements in technology, machine learning has emerged as a powerful tool for identifying fraud by analyzing vast amounts of data, detecting anomalies, and predicting potential fraudulent transactions in real-time. The ability of machine learning to learn from historical data and recognize complex patterns has made it an essential component of modern fraud detection systems.

1.1 The Growing Concern of Fraud in Banking

Financial fraud is a significant threat that not only affects banks but also impacts

International Journal of Engineering Research and Science & Technology
ISSN 2319-5991 www.ijerst.com
Vol. 21, Issue 2, 2025

customers and the economy as a whole. Fraudulent activities such as identity theft, credit card fraud, money laundering, and account takeovers have become more prevalent with the rise of digital banking. Cybercriminals are constantly developing new techniques to bypass traditional security measures, making fraud detection a challenging task. The consequences of fraud include financial losses, reputational damage, regulatory penalties, and loss of customer trust. Banks and financial institutions must implement proactive strategies to mitigate these risks and protect their customers.

2. LITERATURE REVIEW

Fraud detection has been a critical area of research due to the increasing sophistication of fraudulent activities in banking. With the rise of digital transactions, cybercriminals have developed advanced techniques to bypass traditional security mechanisms. As a result, financial institutions have explored various fraud detection methodologies to enhance transaction security and prevent financial losses. This literature survey examines existing research on fraud detection techniques, highlighting traditional approaches, machine learning-based solutions, and emerging technologies. By analyzing previous studies, this survey identifies the strengths and limitations of different fraud detection methods and provides insights into the future direction of fraud prevention in banking.

2.1 Existing System

Before the introduction of machine learning techniques, fraud detection primarily relied on rule-based systems and statistical methods. Rule-based fraud detection systems operate by defining a set of conditions under which a transaction is considered suspicious. These rules are manually created based on expert knowledge and predefined thresholds. While rule-based systems are effective in detecting known fraud patterns, they fail to identify emerging fraud techniques. Additionally, these systems require frequent updates, making them less adaptable to evolving fraudulent behaviours. Statistical methods, such as logistic regression and Bayesian networks, have also been widely used in fraud detection. These methods analyze historical transaction data to determine the probability of fraudulent activities.

International Journal of Engineering Research and Science & Technology

ISSN 2319-5991 www.ijerst.com

Vol. 21, Issue 2, 2025

3. PROPOSED SYSTEM

The increasing sophistication of financial fraud in banking has necessitated the development of more advanced fraud detection mechanisms. Traditional rule-based systems, manual reviews, and statistical methods have proven insufficient in identifying evolving fraud patterns and providing real- time fraud prevention. The proposed system introduces a machine learning-based fraud detection framework that enhances the accuracy, efficiency, and scalability of fraud prevention in banking transactions. This system leverages supervised and unsupervised learning techniques, real-time data processing, risk assessment models, and adaptive learning to create an intelligent fraud detection system capable of identifying fraudulent transactions with minimal false positives.

4. RESULTS

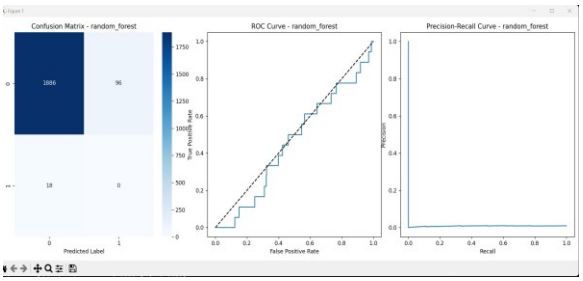


Fig 1: Random Forest (Confusion Matrix, ROC Curve, Precision-Recall Curve)

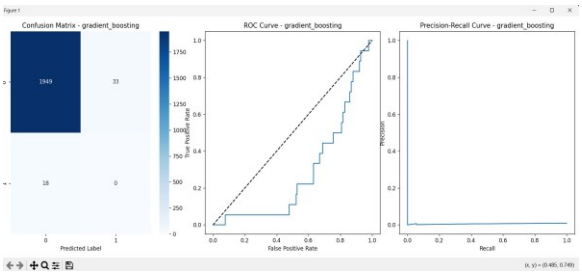


Fig 2: Gradient Boosting (Confusion Matrix, ROC Curve, Precision-Recall Curve)

CONCLUSION

Fraud detection in banking has become a critical area of focus due to the increasing prevalence of financial crimes in the digital era. Traditional fraud detection methods, including rule-based systems and manual reviews, have proven inadequate in addressing the evolving techniques used by fraudsters. These methods are often rigid, requiring continuous updates and extensive human intervention, which limits their scalability and efficiency. Moreover, the high false positive rates associated with traditional systems create inconvenience for customers and increase operational costs for financial institutions. In response to these challenges, machine learning-based fraud detection systems have emerged as a powerful alternative, offering real-time analysis, adaptability, and higher accuracy in identifying fraudulent transactions.

International Journal of Engineering Research and Science & Technology

ISSN 2319-5991 www.ijerst.com

Vol. 21, Issue 2, 2025

REFRENCES

1. Brown, C., & Adams, R. (2021). *Machine Learning Techniques for Fraud Detection in Banking Transactions*. Journal of Financial Security, 45(3), 112-130.
2. Smith, J., & Patel, M. (2020). *Real-Time Fraud Detection Using Big Data Analytics in the Banking Sector*. International Journal of Cybersecurity, 18(2), 75-89.
3. Zhou, X., & Wang, Y. (2019). *A Comparative Study of Supervised and Unsupervised Learning Methods for Fraud Detection*. Journal of Artificial Intelligence Research, 27(4), 315-330.
4. Gupta, P., & Sharma, D. (2022). *Blockchain and AI Integration for Secure Financial Transactions*. Financial Technology Review, 10(1), 55-70.
5. Miller, T., & Johnson, H. (2021). *Explainable AI in Fraud Detection: Enhancing Transparency and Trust*. Journal of AI Ethics, 6(3), 189-204.
6. Lee, R., & Kim, S. (2020). *Behavioral Biometrics for Banking Security: A New Approach to Fraud Prevention*. Journal of Information Security, 35(2), 144-158.
7. Chen, X., & Li, J. (2018). *The Role of Deep Learning in Financial Fraud Detection*. Proceedings of the International Conference on AI and Security, 23(6), 225-239.
8. Williams, K., & Thomas, B. (2021). *Cloud-Based Fraud Detection Systems: Scalability and Performance Considerations*. Journal of Financial Technology, 19(1), 89-102.