

# Emerging Trends in Financial Fraud Detection: Machine Learning and Big Data Analytics in Risk Management

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**Abstract:** *The rise of financial fraud has prompted financial institutions to explore advanced technologies like machine learning (ML) and big data analytics to improve fraud detection and risk management systems. This paper explores the integration of these technologies, highlighting how predictive analytics, AI-driven models, and data visualization can enhance fraud detection, credit risk assessment, and compliance monitoring. Through a thorough literature review and case studies, we show how the incorporation of behavioral insights into machine learning models significantly improves predictive accuracy, enabling financial institutions to manage risks more proactively. We also discuss the role of Business Rules Management Systems (BRMS) in automating decision-making processes and ensuring regulatory compliance. The findings suggest that while ML provides robust mechanisms for fraud detection, continuous advancements in model training and data integration are essential to cope with the dynamic nature of financial threats.*

**Keywords:** Machine Learning, Big Data Analytics, Fraud Detection, Financial Risk Management, Predictive Analytics, Business Rules Management Systems (BRMS), Behavioral Insights, Data Visualization.