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An Intelligent Deep Learning System for Accurate Credit Card Fraud Detection

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Abstract

Online transactions and digital payments have become increasingly common, but this growth has also led to a rise in credit card fraud, creating serious challenges for both banks and their customers. Traditional fraud detection methods, such as rule-based systems or standard machine learning models, often struggle to keep up with the constantly changing tactics used by fraudsters. Another major issue is that transaction datasets are highly imbalanced—legitimate transactions far outnumber fraudulent ones—which can reduce accuracy and increase false alarms. To tackle these problems, this study proposes a deep learning framework that can detect fraudulent credit card transactions quickly and accurately. The system uses advanced neural networks to automatically learn complex patterns in transaction data, reducing the need for manual feature engineering. We also apply data preprocessing and feature selection steps to improve performance. The model was tested on a well-known benchmark dataset and compared with traditional methods. Results show a clear improvement in metrics like accuracy, precision, recall, and F1-score, achieving over 96% detection accuracy while remaining computationally efficient. This study demonstrates that deep learning-based systems can provide practical, adaptive, and secure solutions for detecting credit card fraud in today's digital payment ecosystem.

Keywords: *Credit Card Fraud Detection, Deep Learning, Imbalanced Data, Financial Security, Neural Networks*



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