Credit Card Fraud Detection with Ensemble Model: A Meta-Heuristic Approach

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Abstract : The purpose of this paper is to develop a novel system for credit card fraud detection based on sequential modeling of data using hybrid deep learning models. The projected model encapsulates five major phases are pre-processing, imbalance-data handling, feature extraction, optimal feature selection, and fraud detection with an ensemble classifier. The collected raw data (input) is pre-processed to enhance the quality of the data through alleviation of the missing data, noisy data as well as null values. The pre-processed data are class imbalanced in nature, and therefore they are handled effectively with the K-means clustering-based SMOTE model. From the balanced class data, the most relevant features like improved Principal Component Analysis (PCA), statistical features (mean, median, standard deviation) and higher-order statistical features (skewness and kurtosis). Among the extracted features, the most optimal features are selected with the Self-improved Arithmetic Optimization Algorithm (SI-AOA). This SI-AOA model is the conceptual improvement of the standard Arithmetic Optimization Algorithm. The deep learning models like Long Short-Term Memory (LSTM), Convolutional Neural Network (CNN), and optimized Quantum Deep Neural Network (QDNN). The LSTM and CNN are trained with the extracted optimal features. The outcomes from LSTM and CNN will enter as input to optimized QDNN that provides the final detection outcome. Since the QDNN is the ultimate detector, its weight function is fine-tuned with the Self-improved Arithmetic Optimization Algorithm (SI-AOA).

Keywords : credit card, data mining, fraud detection, money transactions

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