

Abstract

As a result of rapid digitisation, online transactions using credit cards have become popular. With this, fraudulent activities have also increased considerably. Although many supervised and unsupervised machine learning techniques were proposed in past research for identifying fraudulent transactions, they do not fully utilize the tabular and hierarchical structure present in transaction datasets. Recently, the TabBERT neural network model was proposed to calculate row-wise embeddings that capture both inter and intra dependencies between transactions in tabular time series data. In this research, we present a systematic experimental framework to assess the effectiveness of applying the embeddings calculated using the TabBERT model for credit card fraud detection. We employ the calculated row embeddings for fraud detection using three unsupervised machine learning algorithms and two supervised machine learning algorithms. We perform our experiments on a synthetic dataset that has been generated using the TabGPT model. Overall, TabBERT-based embeddings increase the performance of the supervised learning models with the extreme gradient boosting model achieving a precision of 99% and an F1 score of 98%, and the multilayer neural network model achieving a precision of 97% and an F1 score of 95%. For unsupervised learning, the use of TabBERT embeddings increases the recall rate of K-means clustering algorithm by 0.19%.

fraud detection, TabBERT, tabular time series