

Card Fraud Detection models and patterns

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Abstract

Due to the fast development of e-commerce industry and electronic payment ecosystem, Anti-Fraud systems have a market value. Because of the dissimilar format of the data (Fraud and Non-Fraud cases), the detection of fraudulent transactions is difficult to achieve. This paper intends to survey on existing fraud detection models, analyses and compares various popular classifier algorithms that have been most commonly using in detecting fraud behaviour. It focuses on the benchmark used to assess the classification performance and rank those algorithms.

Keywords: Machine learning, Fraud, Data mining, Models, Computational efficiency

1 Introduction

Using credit card in payments is significantly increased nowadays. The challenges in this area are risk reputation and risk of loss for issuer. There are a lot of techniques for credit card fraud detection based on artificial neural network (ANN), machine learning, fuzzy logic, and genetic programming have evolved in detecting fraudulent transactions. The aim of this paper is to provide an up-to-date review of different approaches of classification, compare their performances on a wide range of challenging credit transaction dataset, and draw conclusions on their applicability to fraud detection applications.

2 Related works

Carter and Catlett [1] explored machine learning algorithms i.e., decision trees and probability trees in assessing a good or bad credit risk costs. To generate a fraud score, a radial basis function network with a density based clustering and historical information on transactions used by Hanagandi et al. [2].

Ghosh and Reilly [3] applied a feed-forward neural network based fraud detection system using past data of account transactions of a customer. They found that the network detected significantly more fraud with fewer false positives over rule-based detection system. Dorrnsoro et al. [4] developed an online system based on a neural classifier and a nonlinear Fisher's discriminant analysis for credit card operations fraud detection.

3 Algorithms reviews

3.1 CLASSIFICATION OF CLASSIFICATION PROCEDURES

Classification is used in a wide range of human activity. It

covers any context in which decision or forecast is made on the basis of currently available information. A classification procedure is some formal method for repeatedly making such judgments in new situations. A wide variety of approaches has been taken towards classification task. Two main historical strands of research can be identified: statistical, and computational intelligence [5].

3.2 MACHINE LEARNING CLASSIFIERS

There are many kinds of classification algorithms; these are grouped into Bayesian classifiers, functions, lazy algorithms, meta algorithms, rules, and trees algorithms. This section deals with different classifier algorithm models.

Bayesian classifier: Bayesian classifiers are statistical classifier that predict class membership by probabilities. Several Bayes' algorithms have been developed, such as Bayesian networks and Naïve Bayes. Bayesian classifiers have exhibited high accuracy and speed when applied to large databases e.g. to analyze DNA hybridization arrays, and medical diagnosis.

4 Conclusions

This study compares and analyzes the performance of various machine learning algorithms in detecting fraud behavior. The main objective of this paper is to evaluate the ability of the computational intelligence technique in detecting fraud by reviewing performance measurement. The most important parameters such as classification accuracy and fraud detection rate were considered in performance evaluation. The key finding of this study is that only higher classification accuracy cannot give precise estimate of the misclassification because of fraud rate is too minimal.

References

- [1] Carter C, Catlett J 1987 Assessing credit card applications using machine learning *IEEE Expert: intelligent systems and their applications* 2 71-9
- [2] Hanagandi V, Dhar A, Buescher K 1996 Density-based clustering and radial basis function modeling to generate credit card fraud scores *Computational Intelligence for Financial Engineering*
- [3] Ghosh S, Reilly D L 1994 Credit card fraud detection with a neuralnetwork *In Proceedings of the 27 th Hawaii International Conference on System Sciences* 3 621-30
- [4] Dorrnsoro J R, Ginel F, Sanchez C, Cruz C S 1997 'Neural fraud detection in credit card operations *IEEE Transactions on Neural Networks* 8 827-34
- [5] Michie D, Spiegelhalter D J, Taylor C C 1994 *Machine learning, neural and statistical classification* Ellis Horwood