

# Fraud Detection in Online Transactions using Data Mining Technique

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## Abstract

Now a days as compared to offline transactions, online transaction are more fraudulent. Frauds are not only present in online but regular transaction as well. In today's world, the bank should verify whether the transaction is fraudulent or not. Various advance techniques are used by fraudsters in order to generate fraudulent transactions. In order to cope up with this fraudulent transaction, more advance fraud detection system are required. Data mining techniques are used by most of the banks for credit card fraud detection. In this paper we propose a new credit card fraud detection system based on generation of Behavior Certificate (BC) which reflects the cardholders' transaction history using Random Tree data mining technique.

**Keywords** - Data Mining, Fraud Detection, Behavior Certificate.

## I. INTRODUCTION

At present the modes of payment methods have changed into online transactions. Banking system provides different modes of payments like e-cash, card payments, internet banking, and e-services for improving online transaction. Credit card is one of the common mode of online transaction. Credit card is cashless way of selling goods or services. This increased number of cashless transactions, leads to increase in fraudulent transactions. Any online transaction does not require a physical card but it needs a card number, cvv and expiry date so there is more chances of fraud should be happen. In this technique of fraud detection we are generating a behavior certificate based on cardholder's transaction habits[3]. Credit card fraud detection methods based on anomaly detection try to extract the historical behavior patterns as rules and compute the similarity between an incoming transaction and these behavior patterns using data mining technique[6]. The main idea of this kind of approach is that people may have personalized transaction habits that depend on their different accounts, different income sources, different motivations and so on.

## II. LITERATURE SURVEY

Xu Wei, Liu Yuan [1] in this paper they propose an optimized SVM model for detection of fraudulent credit card model. The model use non-linear SVM and

RBF for the sparse transaction data, and use grid algorithm to determine the optional combination of parameters to detect the fraud. The support vector machine algorithm to construct an optimized SVM model for detection of fraudulent online credit card transaction, which helping the merchants make decision on weather to accept the deal. And then analyze the test results of each model.

N.Malini, Dr.M.Pushpa [2] the author uses KNN algorithm and outlier detection methods to optimize the best solution for the fraud detection problem. These are most important approaches that are proved to minimize the false alarm rates and increase the fraud detection rate. K-nearest neighbor algorithm is used largely in detection systems. It is also proved that KNN works extremely well in credit card fraud detection systems using supervised learning techniques. In this method the new instance query will be classified depending on the KNN category.

Krishna Modi, Reshma Dayma [3] To detect fraud behavior in this author proposed various methods of data mining such as decision tree, rule based mining, neural network, fuzzy clustering approach or hybrid approach of these methods. Any of these methods is applied to find out normal usage pattern of customers (users) based on their past activities.

M.Kavith, Dr.M.Suriakala, [4] author presents a real-time tree based metaclassifier TBMC that can be used to identify fraudulent transactions in huge imbalanced data. The developed metaclassifier based model operates based on predictions in two levels. The first level of predictions is performed by Random Forest classifier, and the second level predictions are performed by an ensemble created with Decision Trees and Gradient Boosted Trees. The results obtained from first and the second level prediction models are integrated to form the final predictions.

Changjun Jiang, Jiahui Song [5] In this paper, they propose a novel fraud detection method that composes of four stages. To identify a cardholder's behavioral patterns, they utilize the cardholders' historical transaction data. By using this data it divide all cardholders into different groups such that the transaction behaviors of the members in the same group are similar. They thus propose a window-

sliding strategy to combine the transactions in each group. Next, we extract a collection of special behavioral patterns for each cardholder based on the combined transactions and the cardholder's historical transactions. Then they train a set of classifiers for each group on the basis of all behavioral patterns. Finally, they use the classifier set to detect fraud. If a new transaction is fraudulent, a feedback mechanism is taken in the detection process in order to solve the problem.

John Richard D. Kho, Larry A. Veal [6] this paper is suggesting that a detection model must be available to capture the possible anomalous transactions – a fallback in case the technology will fail. Several classifiers were evaluated during the model creation however only the Random Tree and J48 yielded the highest accuracy value.

Dhiya Al-Jumeily, Abir Hussain [7] states the types of fraud and current techniques which are being used to avoid fraudulent activities. This technique supports the development of Fraud Detection System.

Kadek Dwi Febriyanti, Rianarto Sarno, Yutika Amelia Effend [8] believes some fraud occurred due to variations in business processes. So this can be detected by applying association rule learning approach. This proposes an idea to present solution for detection of fraudulent activity by learning the historical data.

Balasupramanian, N., Imad Salim Al-Barwani [9] suggests the big data analytics techniques to detect and prevent online fraudulent cases. This paper proposes a system in which data is collected, cleaned & features are extracted. Using these patterns it can prevent the online fraud before it happens.

Dongxu Huang, Dejun Mu, Libin Yang [10] proposes a fraud detection system named as Co Detect which can use both network and feature information for financial fraud detection. It can detect financial fraud activities and feature patterns associated with it.

### III. METHODOLOGY

#### A. Random Tree

Random Tree is the supervised classifier. Random Tree is used to construct the random set of data for constructing decision tree. Random Tree algorithm deals with classification and regression problems. Random Tree is the group of tree predictors that called as forest. In Random Tree, classifier get input feature vector and classify it with every tree in forest and output of class label received majority votes. In regression, the classifier reply average of responses over tree in forest. Random Tree is the combination of two algorithms from machine learning. Single Model Tree combines with Random Tree to improve the functioning of Random Tree. Single Model Tree

is the decision tree in which leaf node hold linear model. Random Tree improve the performance of decision tree. Random Tree is reasonably balanced tree [6]. In this Random Tree one global setting works across the all leaves and thus simplifying optimization procedure. This feature of Random Tree reduces the time and efforts. Random Tree produce slightly better classification accuracy than Random Forest. Random Tree yielded the highest accuracy value of 94.32% [6].

#### B. Random Forest

Random forest is the technique of machine learning. It generally deals with the big data. Random forest is extension of random tree. Random Forest is a supervised learning algorithm. This algorithm is used for classification, regression. It operates by constructing a multitude of decision trees at training time. Random forest is a way of averaging multiple decision trees, trained on different parts of the same training set, which reduces the variance. Random Forest is a flexible, easy to understand and use machine learning algorithm that produces, even without hyper-parameter tuning. It is also one of the most used algorithms, because of its simplicity and the fact that it can be used for both classification and regression. Random forest build multiple decision trees and merge them together to get a more accurate result and stable prediction.

#### C. Weka Tool

Weka stands for Waikato Environment for Knowledge Analysis. Weka is a suite of machine learning software written in Java. Weka contains a collection of visualization tools and algorithms for data analysis and predictive modeling, together with graphical user interfaces for easy access to these functions. Weka supports several standard data mining tasks, specifically, data preprocessing, clustering, classification, regression, visualization, and feature selection. Weka's techniques are predicated on the assumption that the data is available as one flat file or relation, where each data point is described by a fixed number of attributes. Weka uses the Attribute Relation File Format for data analysis, by default. By using the weka tool, we generate the graph of the customer from the given dataset. Generation of graph by using random tree and random forest algorithm.

#### D. Credit Card Fraud Detection System

We have to perform FDS process in this section to detect fraud in credit card. FDS consist of two components BC construction and fraud detection. These two components are connected with each other using database. The BC construction process carried out offline while fraud detection process carried out online.

In FDS, we have to find Behavior Certificate using BFV (Behavior Feature Vector). BFV which

consist of 13 dimensions which describes cardholder transaction behavior.

BFV = (Weekday, Weekend, Festival, Normal Day, Interval1, Interval2, Interval3, Interval4, Location, Range1, Range2, Range3, Range4) is a behavior feature vector, where

- 1) "Weekday" and "Weekend" are to represent whether a transaction take place in weekday or weekend.
- 2) "Festival" and "Normal Day" are to represent whether a transaction take place in festival or not.
- 3) Interval1- Interval4 are four time-intervals.
- 4) "Location" is the area code of the place in which the transaction take place.

5) Range1 – Range 4 are four amount-ranges. Location dimension has only value string as in numbers. All other dimensions returns Boolean value. Boolean values are in form of 0 or 1.

We have transactions dataset of users and on the basis of that dataset we compute BC. Whenever new transaction is ongoing at the same time from the customer transaction database we find some frequent datasets which are uses by customer for making transactions .In these transaction depending upon the BC factor some transactions are in legal pattern and some others in fraud pattern. These patterns are passed to algorithm. Algorithm compares the incoming transaction with existing datasets and gives output as transaction is fraudulent or not.

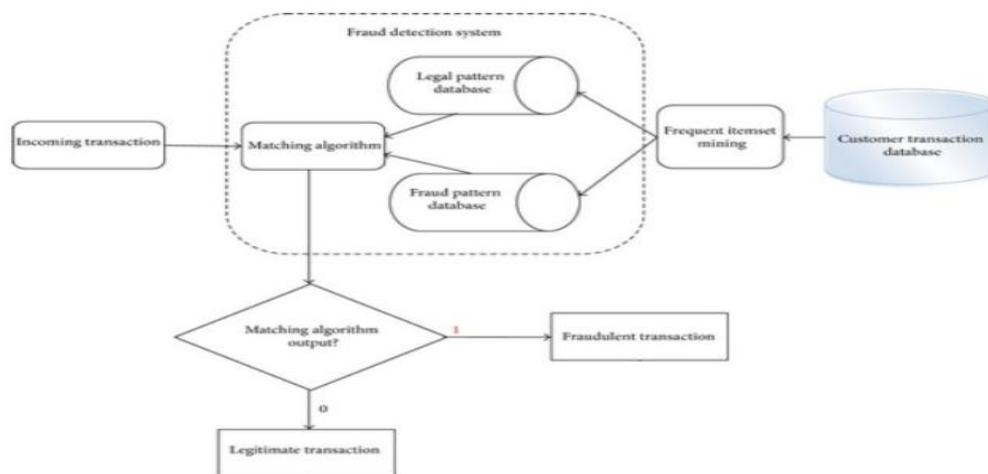


Fig 1: Fraud Detection System

#### IV. CONCLUSIONS

Through a survey of academic peers who were familiar with other fraud detection systems/tools we were able to gain information required for our prototype FDS. In this paper we proposed a new credit card FDS based on behavior certificates (BC) which reflects cardholder’s transaction habits. The correlation between behavior feature and some special cases such as festival, weekend are considered into BC. By applying this system we can detect fraudulent activities by studying its behavior certificate patterns.

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