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## Discovering Fraud in Credit Card by Genetic Programming

**Mayuri Agrawal**

Siddhant College of Engineering, Sudumbare, Pune, India

**Sonali Rangdale**

Siddhant College of Engineering, Sudumbare, Pune, India

### **Abstract:**

*With the increasing use of credit cards in our day-to-day transaction, the credit card fraud has also increased for both online purchases and regular purchase. Due to rapid growth in E-Commerce, rise of fraud transaction is increasing in the mode of electronic payment system. Many efficient methods like sequence alignment, neural networks, fuzzy logic, machine learning, genetic programming, etc. are used to discover frauds in credit card transactions. The Genetic algorithm finds the optimal solution for the problem and implicitly generates the results. This algorithm is to develop a method for detecting fraudulent transaction. In this paper we tried to improve, optimize and use evolutionary search based on the principles of natural selection and genetic programming. It is also used to solve high complexity computational problems. It not only finds the detection of credit card fraud mechanism but also examine the results.*

**Keywords:** Credit card, Credit card fraud, Electronic Payments system, Fraud detection, Genetic algorithm

### **1. Introduction**

A credit card is small plastic card issued by a financial company giving the holder an option to borrow funds, usually at point of sale [3]. In the recent years, credit card has become the most prevailing mode of payment for online and for regular purchase also. In recent years, credit card fraud has increased because of great increase in credit card transactions. Therefore, it is necessary to understand the mechanism of identifying the fraud in credit card. To minimize the fraud in credit card both the physical security of credit card and privacy of credit card number should be maintained. Over the years, to deal with the credit card fraud different prevention and detection methodologies are used.

Fraud detection involves monitoring the behaviour of users in order to estimate, detect, or avoid undesirable behaviour [1]. It has been traditionally seen as a data mining problem to correctly classify the transactions as legitimate or fraudulent transactions. Now it's a classification problem where statistical measures of many data mining algorithms have been used to solve this. Among these, artificial neural networks and decision trees are widely used. For classification problems many performance measures are defined most of which are related with correct number of cases classified correctly. Among these the accuracy ratio, the capture rate, the hit rate, the gini index and the lift is the most popular ones [4].

In this paper, after analysing various credit card fraud detection techniques such as fusion approach using Dempster-Shafer theory and Bayesian learning [3], BLAST-SSAHA Hybridization [2], Hidden Markov Model, Fuzzy Darwinian and genetic programming, found out that genetic algorithm are evolutionary algorithm that obtain better solution as time progresses and can be efficiently use to discover the fraud in credit card.

The rest of paper is organised as follows: - Section II proposes the work with mathematical model and various parameters included in data set. Section III involves the process of Genetic algorithm for credit card fraud detection. The Experimental process for discovering fraud in the card is discussed in Section IV. The paper is finalized with the conclusion in Section V.

### **2. Proposed Work**

This paper proposes a technique to discover a credit card fraud system using genetic algorithm. During the credit card transaction, the fraud is discovered and the number of false alert is being reduced by genetic algorithm. Rather maximizing the numbers of correctly classified transactions, an objective function have been defined where misclassification costs are variable.

The huge losses and the awareness of the relation between loss and the available limit have to be reduced. The fraud has to be discovered in real time with the number of true alert has to be maximized by minimizing the false alert.

There are different actions such as sending SMS, blocking the credit card or calling the cardholder [4] which is helpful to alert the customer about the fraudulent transaction.

An incoming transaction is subjected to the set of available rules and the points obtained from the rules satisfied are summed up to give the total suspiciousness points (TSP). If the TSP is greater than a predetermined threshold either the transaction is rejected or an alert is generated [4].

In this paper discovery of credit fraud is based on customer behavioural variables. The Sample data set has been considered for the generating the fraud transactions and discovery of fraud in the electronic payment systems.

The various parameters involved in the data set are as follows:

- C\_Freq – Frequency of Credit Card used,
- C\_Loc – Location at which Credit Card are in the hands of fraudulent,
- C\_OD – Rate of Over Draft

time,

C\_BB – Balance available at the Bank of Credit Card,

C\_Ds – Average Daily spending amount.

### 2.1. Mathematical Model

Data Set,  $T = \{t_1, t_2, t_3 \dots t_n\}$

D - One data object,  $D \in T$

If p parts of data set named P such that  $P \in T$  and is far away from object D, then D is considered to be a common object.

The proposed system overcomes the credit card fraud in an efficient way using genetic algorithm through which the false alert is minimized and it produces an optimized result.

In the proposed system fraud is discovered based on customer's behaviour. A new classification problem which has a variable misclassification cost is introduced [4]. Hence the genetic algorithms is made where a set of interval valued parameters are optimized. The number of true can be maximized by determining the current values of the parameters C\_Freq, C\_Loc, C\_OD, C\_BB, and C\_Ds and then the critical values are compared with the data set parameters provided that the numbers of alerts do not exceed a certain level.

### 3. Genetic Algorithm Implementation

Genetic algorithms are evolutionary algorithms which aim at obtaining better solutions as time progresses. When a card is accessed by fraudulent, they usually used until its available limit is depleted. Figure 1 shows the flow of Genetic Algorithm process. The best solution using genetic algorithm is found by repeating this procedure until a pre-specified numbers of generations have passed. To get a better performance, a parametric procedure needs to be undertaken where list of the parameters and the settings are needed to generate fraud transaction.

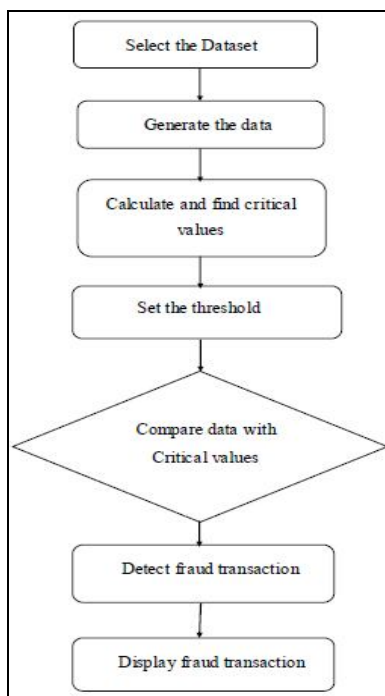


Figure 1: Flow of Genetic Algorithm Process

### 3.1. Process of Genetic Algorithm

- Initially the initial population is selected randomly from the sample space which has many populations.
- The fitness value is calculated for each chromosome in each population and is sorted out.
- In selection process two parent chromosomes are selected through tournament method.
- The Crossover forms new offspring (children) from the parent chromosomes using single point probability.
- Mutation mutates the new offspring using uniform probability measure.
- In elitism selection the best solution are passed to the further generation.
- The new population is generated and undergoes the same process it maximum number of generation is reached.

### 3.2. Experiment Process

The Experiment process is carried out with four steps:-

Step 1: Group of data credit card transactions as input with every transaction record with n attributes, and standardize the data, get the sample finally, which includes the confidential information about the card holder, store in the data set.

Step 2: Calculate the critical values, C\_Freq, C\_Loc, C\_OD, C\_BB and C\_Ds.

Step 3: After limited number of generations find the critical values.

Step 4: Discover fraud transactions using this algorithm.

This process and detection procedure analyse the feasibility of credit card fraud detection based on critical values.

### 4. Conclusion

In this paper we present the genetic algorithm that will discover fraud transaction in credit cards. Although genetic algorithm has been applied in many areas, many financial organisations are seeking efficient framework for predicting and assessing financial risks.

In this study with the given sample data set fraud discovery and fraud transactions are generated. With the help of this algorithm the probability of fraudulent transactions can be predicted soon after credit card transactions by the banks with a series of anti-fraud strategies can be adopted to reduce risks and to prevent banks from great losses.

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