Credit Card Fraud Detection & Prevention of Fraud Using Genetic Algorithm

Rinky D. Patel, Dheeraj Kumar Singh

Abstract*— Companies and institutions move parts of their business, or the entire business, towards online services providing e-commerce, information and communication services for the purpose of allowing their customers better efficiency and accessibility. Payment card fraud has become a serious problem throughout the world. Companies and institutions loose huge amounts annually due to fraud and fraudsters continuously seek new ways to commit illegal actions. In this we will try to detect fraudulent transaction through the with the genetic algorithm. Genetic algorithm are used for making the decision about the network topology, number of hidden layers, number of nodes that will be used in the design of neural network for our problem of credit card fraud detection.

Index Terms*— Credit cards; Credit card fraud detection; Artificial neural networks; Genetic algorithm.

I. INTRODUCTION

The credit card is a small plastic card issued to users as a system of payment. It allows its cardholder to buy goods and services based on the cardholder's promise to pay for these goods and services. Credit card security relies on the physical security of the plastic card as well as the privacy of the credit card number. Globalization and increased use of the internet for online shopping has resulted in a considerable proliferation of credit card transactions throughout the world. Thus a rapid growth in the number of credit card transactions has led to a substantial rise in fraudulent activities. Credit card fraud is a wide-ranging term for theft and fraud committed using a credit card as a fraudulent source of funds in a given transaction. Credit card fraudsters employ a large number of techniques to commit fraud. To combat the credit card fraud effectively, it is important to first understand the mechanisms of identifying a credit card fraud. Over the years credit card fraud has stabilized much due to various credit card fraud detection and prevention mechanisms. Fraud can be defined as the undesired activities taking place in an operational system. Fraud can appear in a variety of different domains including finance, telecommunications, health care and public services.

Here we will discuss about the Credit Card Fraud. Simply, Credit Card Fraud is defined as, "when an individual uses another individuals' credit card for personal use while the owner of the card as well as the card issuer are not aware of the activity that the card is being used." It is like unauthorized account activity by a person in which that account was not intended for use. In this study we are concerning the financial frauds and will particularly focus on detecting fraudulent credit card transactions. The measure is needed due to inherent structure of credit card (CC) transactions. This is about optimizing the parametric fraud detection solution. The amount of losses due to fraud and the awareness of the relation between loss and the available limit on the CC have forced us to develop a good performance solution.

In recent years, the prevailing data mining concerns people with credit card fraud detection model based on data mining. Since our problem is approached as a classification problem, classical data mining algorithms are not directly applicable. So an alternative approach is made by using general purpose heuristic approaches like genetic algorithms. This paper is to propose a credit card fraud detection system using genetic algorithm. Genetic algorithms are evolutionary algorithms which aim at obtaining better solutions as time progresses. When a card is copied or stolen or lost and captured by fraudsters it is usually used until its available limit is depleted. Thus, rather than the number of correctly classified transactions, a solution which minimizes the total available limit on cards subject to fraud is more prominent. It aims in minimizing the false alerts using genetic algorithm where a set of interval valued parameters are optimized. Among decision trees are more popular. Fraud detection has been usually in domain of E-commerce, data mining. The Genetic algorithms are evolutionary algorithms in which the aim is to obtain the better solutions as it is technically to eliminate the fraud, a high importance has given to develop efficient and secure electronic payment system to detect whether a transaction is fraudulent or not.

II. RESEARCH ELABORATIONS

Fraud detection involves monitoring the behavior of users in order to estimate, detect, or avoid undesirable behavior. To counter the credit card fraud effectively, it is necessary to understand the technologies involved in detecting credit card frauds and to identify various types of credit card frauds. There are multiple algorithms for credit card fraud detection. They are artificial neural-network models which are based upon artificial intelligence and machine learning approach, distributed data mining systems, sequence alignment algorithm which is based upon the spending profile of the cardholder, intelligent decision engines which is based on artificial intelligence, Meta learning Agents and Fuzzy based systems. The other technologies involved in credit card fraud detection are Web Services-Based Collaborative Scheme for Credit Card Fraud Detection in which participant banks can share the knowledge about fraud patterns in a heterogeneous and distributed environment to enhance their fraud detection capability and reduce financial loss, Credit Card Fraud Detection with Artificial Immune System, CARDWATCH: A Neural Network Based Database Mining System for Credit Card Fraud Detection which is bases upon data mining approach and neural network models will counter frauds in credit cards and also used in intrusion detection, case-based reasoning for credit card fraud detection, Adaptive Fraud

Manuscript received on January, 2013.

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Detection which is based on Data Mining and Knowledge Discovery, Real-time credit card fraud using computational intelligence, and credit card fraud detection using self-organizing maps. Most of the credit card fraud detection systems mentioned above are based on artificial intelligence, Meta learning and pattern matching.

It is to develop a credit card fraud detection system using genetic algorithm. During the credit card transaction, the fraud is detected and the number of false alert is being mini-mized by using genetic algorithm. Instead of maximizing the numbers of correctly classified transactions we defined an objective function where the misclassification costs are variable and thus, correct classification of some transactions are more important than correctly classifying the others.

The high amount of losses due to fraud and the awareness of the relation between loss and the available limit have to be reduced.

The fraud has to be deducted in real time and the number of false alert has to be minimized.

There are different devices helpful to do about that transaction. The possible actions are blocking the card, sending SMS or calling the card holder.

In financial institutions, use the fraud detection which is based on customer behavior variables. The Sample data set has been considered for the generating the fraud transactions and detection of fraud in the electronic payment systems.

The various parameters are involved in the data set.

CCfreq= number of times card used

CCloc = location at which CCs in the hands of fraudsters

CCoverdraft = the rate of overdraft time

CCbank balance = the balance available at bank of CC

CCdailyspending =the average daily spending amount

Data set T={t1,t2,t3,….,tn}, U is one data object, If p parts of data set named S in data set is far away from object U, S Є T, U Є T, then U is Common object.

The proposed system overcomes the above mentioned issue in an efficient way. Using genetic algorithm the fraud is detected and the false alert is minimized and it produces an optimized result.

The fraud is detected based on the customer‘s behavior. A new classification problem which has a variable misclassification cost is introduced. Here the genetic algorithm is made where a set of interval valued parameters are optimized.

III. GENETIC ALGORITHM

Genetic Algorithm (GA) is an optimization technique that attempts to replicate natural evolution processes in which the individuals with the considered best characteristics to adapt to the environment are more likely to reproduce and survive. These advantageous individuals mate between them, producing descendants similarly characterized, so favourable characteristics are preserved and unfavourable ones destroyed, leading to a progressive evolution of the species.

In other words The basic idea of genetic algorithms is that given a problem, the genetic pool of a specific population potentially contains the solution, or a better solution. Based on genetic and evolutionary principles, the genetic algorithm repeatedly modifies a population of artificial structures through the application of initialization, selection, crossover, and mutation operators in order to obtain an evolved solution.

Artificial genetic algorithm aims to improve the solution to a problem by keeping the best combination of input variables. It starts with the definition of the problem to optimize, generating an objective function to evaluate the possible candidate solutions (chromosomes), i.e., the objective function is the way of determining which individual produces the best outcome.

IV. RESULTS OR FINDING

The Experiment process has four steps.

Step1. Input group of data credit card transactions, 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.

Step2. Compute the critical values, Calculate the CC usage frequency count, CC usage location, CC overdraft, current bank balance, average daily spending

Step3. Generate critical values found after limited number of generations. Critical Fraud Detected, Monitor able Fraud Detected, Ordinary Fraud Detected etc. using Genetic algorithm

Step4. Generate fraud transactions using this algorithm. This is to analyze the feasibility of credit card fraud detection based on technique, applies detection mining based on critical values into credit card fraud detection and proposes this detection procedures and its process.

Genetic algorithm The initial population is selected randomly from the sample space which has many populations. The fitness value is calculated in each population and is sorted out. In selection process is selected through tournament method. The Crossover is calculated 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 as shown in Fig.

The basic GA operators are crossover, selection and mutation.

i. *Selection*—or survival of the fittest. The key to selection is to give preference to better outcomes.
ii. *Mutation*—or randomly trying combinations and evaluating the success (or failure) of the outcome.
iii. *Crossover*—or combining portions of good outcomes in the hope of creating an even better outcome.

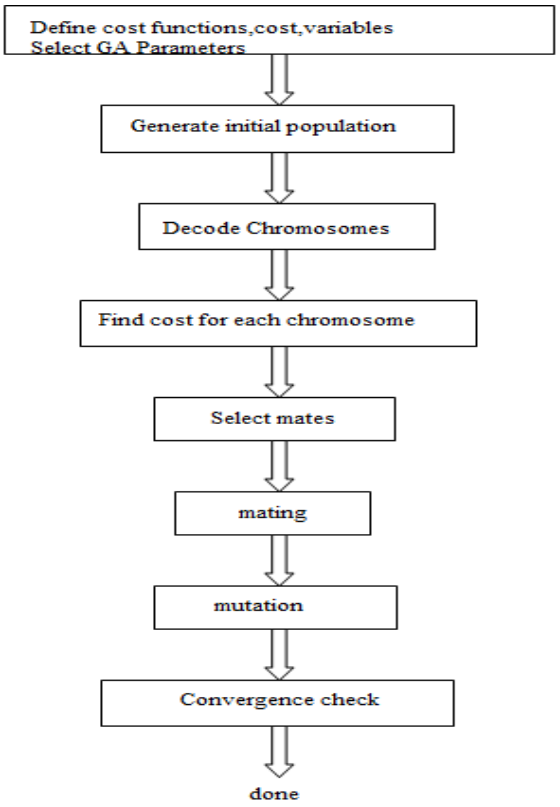

Fig. :Process Flow of Genetic Algorithm

V. CONCLUSION

Credit card is a very helpful instrument for the purpose of payments. This helps the cardholders to purchase different goods and services. This ensures that the cardholder will pay for the goods and services they have purchased. Security of credit card depends on privacy of a number. With the wide use of credit cards today, we are facing lots of frauds as well. There are different techniques implemented by fraudsters to commit credit card fraud. If we can properly understand the concepts and identify the mechanism of fraud then we can easily combat with credit card frauds. Now, we have lots of techniques available through which we can stabilize the credit card frauds. If there is any unauthorized activity is performed by a person on any credit card without the knowledge of owner then it is called Credit Card fraud. In this whole study we are going to mainly concentrate on detecting the credit card transactions and frauds. In recent scenarios, an approach is used called genetic algorithms which are alternative approach. This paper is created to propose a fraud detection technique with the help of genetic algorithms. The genetic algorithms are evolutionary and its main aim is to get better solution so that we can technical eliminate the credit card frauds. With this we can develop most secure payment system that can detect whether our transaction is fraudulent or not.

VI. ACKNOWLEDGMENT

I take this opportunity to express my profound gratitude and deep regards to my guide Dheeraj Kumar Singh for his exemplary guidance, monitoring and constant encouragement throughout the course of this paper. I am also thankful to my friends who helped me throughout the research whenever required.

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