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Credit – Card Fraud Detection System: Using Genetic Algorithm

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ABSTRACT

As we know that with the increase in the use of credit card for purchasing the products online is increasing, so is the fraud related to it is also increasing. Numbers of Fraud transactions are also increasing day by day not only online but also off line as well. At the same time, there are various modern techniques to detect the frauds in credit-card transactions such as Data Mining, Genetic Algorithms, Neural Network, Fuzzy Logic, Machine Learning etc. This paper will talk about using Genetic Algorithm (technique for finding the optimal solution) for the problem and also generates the result of the fraudulent transactions. Genetic Algorithm is used to make decision about the network topology, number of hidden layers, and number of nodes that can be used in designing the neural network for solving our credit - card fraud detection problem.

Keywords-Credit Card Fraud, Credit Card Fraud Detection, Genetic Algorithm, Fraudulent transaction, customer

INTRODUCTION

As we know that a credit card is a small and handy plastic card that is issued by the bank that contains the unique identification such as signature that authorized the person to purchase goods and services on credit and the charges for which will be billed periodically. The information that is stored on the credit card can be read by the Automatic Teller Machines (ATM's), store readers, banks and also used in online Internet Banking System. One of the most important aspects about the credit card is that, it contains a unique card number and the security of the credit card depends on the privacy of the credit card number which is confidential. Due to the rapid growth of credit card transactions has led to a considerable increase in fraudulent activities. Credit card fraud is an extensive term for the theft and fraud committed using credit card as a fraudulent source of funds in the given transactions. In general, the statistical methods and the data mining algorithms can be used to solve this fraud detection problem. The large number of credit card fraud detection system are based on artificial intelligence, meta learning and pattern matching. The main aim of the genetic algorithm is to obtain the better solution so as to remove the fraud[1]. The main goal is to develop efficient and secure electronic payment system to detect whether a transaction is fraudulent or not. Here in this paper, we are going to talk about credit card fraud and the measures to detect the fraud. Credit card fraud arises when one person uses other persons' card for their personal use without the knowledge of the card holder. When a card is captured, or stolen or lost, it is used by the fraudsters until the entire available limit of the credit card is depleted [2]. Therefore, we need a way out, which minimizes the total available limit on the credit card which is more prominent to fraud. It aims in minimizing the false alerts using genetic algorithms where a set of interval valued parameters are optimized [2]. Thus the Genetic Algorithm will cause a better solution to such problems. The importance is given on developing efficient and secure electronic payment system for detecting the fraudulent transactions [1].

2. DIFFERENT TYPES OF TECHNIQUES USED IN CREDIT CARD FRAUD:

The usage of credit card does not only provide us with comfort and convenience while doing shopping but has also attracted malicious characters as it is the easiest way to earn a huge amount of money in a very short span of time. And also it takes some amount of time to realize that the fraud has occurred to the users. The most common technique that is used by the fraudulent users are:

- Copying a credit card and by some means or the other getting hold of the secret pin of the user.
- Vendors charging more money from the users' credit card compared to what they have agreed to and without the user being aware of the charged money.

It is not only the customers' that suffers but also the banks that issues the credit cards also suffer from losses and therefore it is very important to reduce the illegitimate use of the credit card. This can be done by developing various credit card fraud detection techniques. Fraud detection can be done after examining the large number of transactions, identifying them and then categorizing them into genuine transaction and the fraudulent transaction [1]. As a general rule , the main objective of the fraud detection is to maximize the correct predictions and to keep the wrong prediction at an acceptable level of cost.

3. PROBLEMS WITH CREDIT CARD FRAUD DETECTION:

The credit card fraud detection is very difficult to implement in practice because of large number of issues associated with it. One such problem is that, there is not enough literature available that provides experimental results on the real world data so that academic researchers can perform experiments on that data. The reason behind this is that the financial data which is sensitive is related with the fraud that has to be kept confidential for the purpose of customers' privacy. But then, fraud detection system should have the following properties in order to achieve good and proper results. These are [3]:

- The system should be able to handle skewed distribution, as only a very small percentage of all credit card transactions is fraudulent [4].
- There should be a correct way to handle noise (It refers to the error present in the data) e.g. incorrect dates. This noise in the actual data limits the accuracy of generalization that can be accomplished irrespective of how extensive the training set is [3].
- Another perform related to the credit card fraud detection is overlapping data. Many transactions are assumed to be fraudulent while actually they are genuine transaction (False alarm). Sometimes the opposite can also happen, when the fraudulent transactions appears to be normal (false negative)[3]. The system should have the ability to eliminate and minimize these problems so as to achieve maximum accuracy [5].
- The system should be able to adapt themselves to new kind of frauds , as eventually , the successful fraud technique will decrease in efficiency due to the fact that they becomes well- known since a competent fraudster will always find innovative ways for performing his job.
- There is a need for good metrics to estimate the classifier system. In general, the overall accuracy is not appropriate for estimating the skewed distribution, since even with the very high accuracy; almost all fraudulent transactions can be misclassified.
- The system should keep in mind the amount of money that is being lost due to fraud and the amount of money that will be required to detect that fraud. For example, no profit is made by stopping a fraudulent transaction that is way lesser than the amount of money that will be required to detect it [1].

All these above points direct us to the decision layer, which is the most important requirement of the fraud detection system. The decision layer has to take into account, what actions should be taken when a fraudulent behavior is observed taking into account various factors such as the frequency and the amount of transactions.

4. CREDIT CARD FRAUD DETECTION METHODS:

This method is used to find out whether the given transaction is a genuine or fraudulent. In case if the transaction is fraudulent, then the detection system must recognize the fraudulent transaction and produce an alert/ alarm for such transactions. By doing the literature survey, there are various methods that can be used to detect credit card fraud detection. Some of these are as follows [6]:

- Artificial Neural Network
- Bayesian Network

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- Decision Tree
- Neural Network
- Hidden Markov Method
- Outlier Detection
- Genetic Algorithm

This research paper will give emphasis on Genetic Algorithm and also explain about how it is used in credit card fraud detection system.

5. CREDIT CARD FRAUD DETECTION USING GENETIC ALGORITHM:

The Genetic Algorithms are evolutionary algorithms whose main objective is to obtain the better solution to the problem, so as to technically eliminate the fraud [7]. The main significance is given to develop secure and efficient e-payment system so as to identify whether a given transaction is fraudulent or not. At the time of doing the transactions using the credit card, it detects the fraud in real time and also minimizes the number of false alerts by using genetic algorithm. The fraud that is detected is based on the customers' behavior [8].

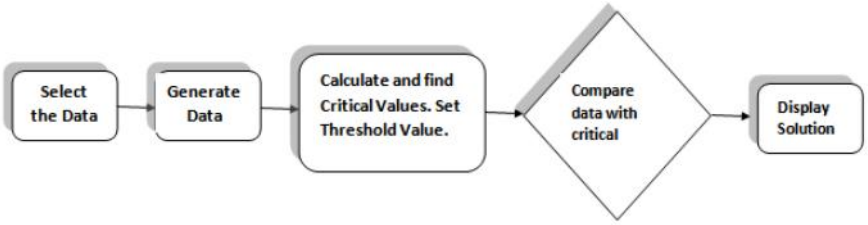

Fig 1: A simple method of Genetic Algorithm

The procedure in the Genetic Algorithm is repeated, until a pre-specified number of iterations are passed and finally the best solution is obtained. It is a parametric procedure used to obtain the better performance for the problem undertaken. To generate fraud transactions, the various lists of parameters and their settings are needed. These parameters can be used to compute the critical values, to calculate the credit card usage frequency count, credit card usage location, credit card overdraft, current bank balance, average daily spending etc.

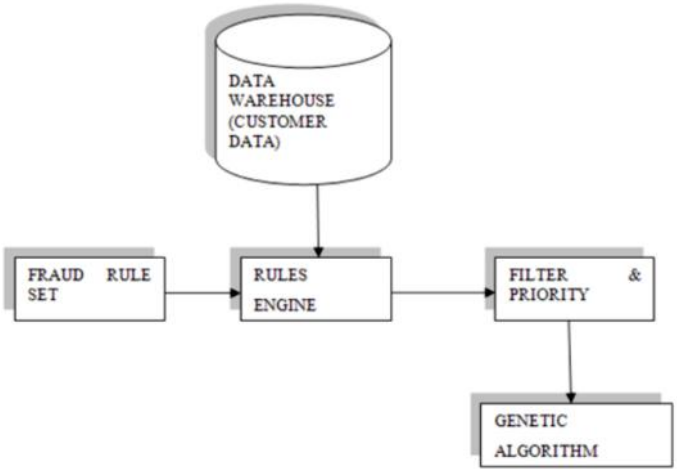

Fig 2 : System Implementation Plan

The above architecture describes the basic work structure of the model. The customer confidential information is stored in the data warehouse that is exposed to the rule engine which consists of the fraud rule set. The filter and the priority module sets the priority of the information and then sends it to the genetic algorithm which performs its function and generates the output.

The major goal of the Genetic Algorithm is to acquire better and optimal solution to the problem. If the Genetic Algorithm is applied to bank credit card fraud detection system, the probability of the fraud transactions can be predicted as soon as the credit card transactions are done by the bank and a series of anti-fraud strategies can be implemented so as to prevent the banks from losses and reduce the risk.

In Case if the customer is making online payment through the credit card, he performs the following steps [9]:

Step 1: Customer has to perform Sign-In first. i.e. the customer has to first register and enter personal details before going for online shopping.

Step 2: Then in the second step the customer has to browse the product and select the service.

Step 3: Then the customer enters his credit card information, as a result this information is received by the system.

Step 4: The system then apply the mining technique to authenticate the user. If the user is authenticated, then the request is processed.

Step 5: Else Generate the OTP (One Time Password) , then the image of OTP is created, and grey scale , threshold image is created which is required for image processing. Shares are generated from which Share 1 is send to the user through network and Share 2 is generated through mail.

Step 6: After receiving the shares, the share 1 and share 2 are combined

i.e. Share 1 + share 2= OTP

which means Share 1 and Share 2 are combined to generate the original OTP.

Step 7: In this step, the user enters the OTP. If this OTP is correct i.e. if it matches with the OTP sent by the system, then the transaction is processed. Else if this OTP does not match, then the account is locked.

6. RESULT:

The proposed system can overcome this problem, in an effective manner. This way, genetic algorithm is used to detect the fraud which leads to reduction in false alert which leads to generation of efficient result. The fraud is detected which is relevant to the customer's behavior. A new classification problem which has inconsistent misclassification cost is introduced. Here the genetic algorithms is used where a set of interval valued parameters are optimized.

7. CONCLUSION:

In this paper, we have seen various methods that can be used to detect credit card fraud mechanism and also examine the result based on the principles of this algorithm. Genetic Algorithm is appropriate in such kind of application areas. Such algorithm in credit card fraud detection system can be used to detect or predict the fraud in a very short period of time after doing the credit card transactions. Ultimately this prevents the banks and customers from huge losses and finally leading to reduction of risk.

REFERENCES

[1] Trivedi, I, Monika& Mridushi,M. (2016, Jan).Credit Card Fraud Detection, International Journal of Advanced Research in Computer and Communication Engineering (Vol. 5)

[2] Patel, R. D., & Singh, D. K. (2013). Credit card fraud detection & prevention of fraud using genetic algorithm. *International Journal of Soft Computing and Engineering*, *2*(6).

[3] Al-Khatib, A. (2012). Electronic payment fraud detection techniques. *World of Computer Science and Information Technology Journal (WCSIT)*, *2*(4), 137-141.

[4] CliftonPhua, DammindaAlahakoon, and Vincent Lee; "Minority Report in Fraud Detection: Classification of Skewed Data"; Sigkdd Explorations, Vol. 6, Issue 1, p.p. 50-51.

[5] Andreas L. Prodromidis and Salvatore J. Stolfo; "Agent-Based Distributed Learning Applied to Fraud Detection"; Department of Computer Science- Columbia University; 2000.

[6] Aravindh, M. S., & Bai, M. W. J. S. TECHNIQUES TO PREVENT CREDIT CARD FROM VARIOUS FRAUDLENT BY GENETIC ALGORITHM AND HIDDEN MARKOV MODEL.

[7] Sethi, N., & Gera, A. (2014). A revived survey of various credit card fraud detection techniques. *International Journal of Computer Science and Mobile Computing*, *3*(4), 780-791.

[8] K.RamaKalyani, D.UmaDevi, „Fraud Detection of Credit Card Payment System by Genetic Algorithm", International Journal of Scientific & Engineering Research Volume 3, Issue 7, July-2012.

[9] Murdande, S., &Sonavane, P. (2016). AN EFFICIENT CREDIT CARD FRAUD DETECTION TECHNIQUE USING GENETIC ALGORITHM. *International Education and Research Journal*, *2*(5).