A STUDY OF INTELLIGENT TECHNIQUES FOR CREDIT CARD FRAUDULENT TRANSACTIONS

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ABSTRACT- *The modern world runs by effective scientific system and modern technologies .In today's world most of the people are using electronic payment system all over the world and credit cards are used widely. With the popularity of credit cards, there is a big revolution in the area of online payment system. With the increase in use of credit cards, fraudulent also goes on increasing dramatically. To maintain the reliability of the payment system, it becomes more essential to improve fraud detection system. Assurance should be given by the criterion for secured transaction so that credit card owner can make electronic payments safely. A comparative study of many modern and new techniques for Credit Card Fraud Detection, namely. clustering approach, Genetic algorithm. Decision Trees, Hidden Markov Model, Artificial intelligence etc developed in detecting various credit card fraudulent transactions shall be discussed.*

KEYWORDS- Credit Card Fraud Detection Methods; Credit Card Fraud;

1. INTRODUCTION-

The rapid growth in electronic commerce technology led to increase in use of online credit card payment mode. With the usage of credit card, the number of frauds associated with it also increases. A large number of techniques are used by credit card fraudsters to commit fraud .To

eradicate the credit card fraud effectively, it is more important to understand the mechanism of identifying a credit card fraud.

From many years credit card utility has stabilized much due to various credit card fraud detection and prevention methods. We can define fraud as the undesired activities taking place in an operational system. Fraud can be measured in a variety of different domains including telecommunication healthcare and public services and finance. Hence, the credit card fraud is happens 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 of the card being used. It is like unauthorized account activity by a person at a time account was not intended for use. Since earlier times the fraud is detected only when the billing of credit card is done.But a better measure can be to prevent fraudulent transactions and predict them before so as to assure unexposed transactions for credit card owners.

2. SOME CREDIT CARD FRAUD TECHNIQUES

Classification or prediction in a dataset requires keen observation of predictive parameters .The various algorithms are mostly recommended as predictive methods as a means of detecting fraud. The different techniques which has been under study for credit card transaction are mentioned in the subsections.

2.1 GENETIC ALGORITHM

Algorithms are mostly recommended as predictive methods as a means of detecting fraud. One of the algorithm as suggested by Bentley et al. (2000) is based on genetic programming in order to establish logic rules capable of classifying credit card transactions into suspicious and non-suspicious classes. This method is basically followed by the scoring process. Tested rules were of different types with the different fields. The best rule is the one with the highest predictability. This method has proven results for real home insurance data and could be one efficient method against credit card fraud. The main motive of genetic algorithm is to obtain the better optimal solution, and also fraud transactions are generated with the given enough data set. Genetic

algorithm works in the manner of efficient and secure electronic payment detect whether a transaction is fraud or not.

In credit card transactions there are various numbers of attributes. Firstly it would select the dataset of the credit card going to process and from that select the method to standardize the data, it will also include the full detail about the card holder.

The various kinds of parameters are involved in the data set.

CCloc= location at which credit cards in the hand of fraudsters.

CCoverdraft =The rate of overdraft time.

CCfrequency= number of times card used.

CCbank balance=the balance available at bank of credit card.

CCdaily spending=the average daily spending amount.

The given system overcomes the issue in an efficient way. By using genetic algorithm the fraud is detected and the false alert is minimized and it produces proper result.

2.2 CLUSTERING ALGORITHM

The clustering techniques are suggested by Bolten and Hand (2002) for behavioral fraud. The peer group analysis is a system that allows identifying accounts that are behaving differently from others at one moment in time but they were behaving the same previously. Those accounts are then put as the suspicious accounts. Fraud analysts have to investigate those cases. The hypothesis of the peer group analysis shows that if accounts behave the same for a certain period of time and then one account is behaving significantly differently, this account has to be notified. Break- point analysis uses a varied approach. The hypothesis is that if a change of card usage which is notified on an individual basis, the account should be investigated. In other words, based on the transactions of a single card, the break-point analysis can identify suspicious analysis and can identify suspicious behavior. Signals of suspicious behavior are unexpected transactions for a high amount, and a high frequency of usage.

2.3 DECISION TREES

Bastos (2007) proposes a bankruptcy prediction technique using boosted decision trees. "Boosting is a procedure that aggregates many 'weak' classifiers in order to achieve a high classification performance". A number of decision trees should be used individually to produce a bankruptcy prediction for a given customer. The "weighted majority vote" should be introduced to combine all the predictions together in order to derive the final outcome .This boosting technique will overcome the instability problem of decision trees.

Li et al. (2010) suggest the use of C&RT decision tree algorithm – which has been proposed by Leo et al. (1984) – in order to predict corporate bankruptcy. Their experimental results are very promising since they achieved a predictive accuracy.

2.4 HIDDEN MARKOV MODEL

HMM is finite set of states associated with some probabilities with it . In every state it generates outcome according to the certain probability associated with that particular state. The outcomes of state can be visible but the states are hidden, so named Hidden Markov Model. Hidden Markov Model is used for detecting credit card frauds by analyzing and calculating the spending profiles of credit card holder. Spending profiles of the user can be calculated by the user's past history of transaction in terms of attributes like transaction amount, IP address, shipping address & location of last transaction, etc. Hidden Markov Model should be categories in spending profiles of the user into 3 different categories such as high, medium, low . HMM is carried out in two steps, in first step HMM model is been trained on basis of past transaction history and in second step HMM takes the input and check whether transaction details are accepted by trained HMM or not, otherwise it raise the alarm.

2.5 BIOMERICS

By using this technique we can accurately verify if the credit card transaction is fraud. This technique implemented by the IRPV (Iris Recognition and Palm Vein) . This technique provides

the two step mechanism for the security Iris Recognition and Palm Vein Authentication. This technical method provides 99.9% accuracy for fraud detection because no two persons have same attributes for Iris and Palm. The biggest disadvantage of this system is the cost for the palm and vein recognition. If some disaster happen with the person due to which the person can lose identity; in this case he can't access his credit card. Nowadays this method is not in use.

The findings put by known researchers in this field is comparatively and analyzed is shown below

Table.1. A Summary of studies investigating different intelligent in credit card fraud.

STUDY	COUNTRY	METHOD	DETAILS
BENTLLY ET AL. (2000)	UK	GENETIC PROGRAMMING	LOGIC RULES AND SCORING PROCESS
BOLTEN & HAND (2002)	UK	CLUSTERING PROGRAMMING	PEER GROUP ANALYSIS AND BREAK POINT ANALYSIS
BROUSE ET AL. (1999)	GERMANY	DATA MINING TECHNIQUES AND NEURAL NETWORKS	DATA MINING APPLICATION COMBINED PROBABILISTIC AND NEURO ADAPTIVE APPROACH

FAN ET AL. (2001)	USA	DECISION TREE	INDUCTIVE DECISION TREE
GHOSH &REILY (1994)	USA	NEURAL NETWORKS	FRAUD DETECTION SYSTEM
ALEKEROV ET.AL (1997)	GERMANY	NEURAL NETWORKS	CARD WATCH
CHAN ET. AL (1999)	USA	ALGORITHMS	SUSPECT BEHAVIORAL PREDICTION
EZAWA &NORTAN (1996)	USA	DECISION TREES	INDUCTIVE DECISION TREES
ZASLAVSKY &STRIZKAK (2006)	UKRAINE	NEURAL SYSTEM	RULES AND ALGORITHMS FOR DETECTION OF FRAUDULENT OPERATIONS
KIM &KIM (2002)	KOREA	NEURAL NETWORKS	FRAUD DETECTION SYSTEM
LEONARD (1995)	CANADA	EXPERT SYSTEM	RULE BASED SYSTEM FOR FRAUD DETECTION

CONCLUSION AND FUTURE WORK

The credit card risk monitoring system is one of the key tasks for the merchant banks, organization to improve merchants risk management level in an automatic, scientific and adequate way. There are many ways of detection of credit card fraud. If one of these or combination of algorithm is applied into bank credit cards fraud detection system, the probability of fraud transactions can be predicted soon after credit card transactions by the banks. And a series of anti fraud strategies can be adopted to prevent banks from great losses before transactions and hence reduces risks. The paper gives contribution towards the effective ways of credit card fraudulent transaction detection methods. The author shall devise a new innovative technique based on more behavioral parameters as rules contributing t prevention of fraud transactions.

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