Review of Credit Card Fraud Detection using Data Mining Techniques

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Abstract : Now-a-days credit card fraud is growing significantly with the development of new technology. Because of super highways of communication. Credit card costs consumers, financial institution and banks billions of bucks each year. Because credit card becomes the most popular mode of payment for both online and offline. Fraudster continuously tries to commit illegal actions. Therefore, fraud detection systems have become necessary for banks and financial institution to reduce their losses. The most commonly practiced techniques for credit card fraud detection are such as Genetic algorithm, Naïve Bayes, Neural Network etc. The aim of this paper is to offer a relative survey of different data mining tools and techniques to find out the best technique for credit card fraud detection. First part of the paper introduces the credit card fraud detection and their types. Next part discusses literature survey. The third part talks about the data mining techniques and their advantages and disadvantages and then the last part is the comparison and their conclusion. The Result of this comparison indicates that the classification technique and ensemble classification technique give the best performance with high accuracy rate.

***IndexTerms* - Data Mining, Credit card Fraud, Types of fraud, Classification.**

I. INTRODUCTION

In Today's electronic society, e-commerce has become an essential sales channel for global business. Due to the rapid advancement of e-commerce, use of credit card for purchase has dramatically increased in, fraudulent or illegal use of credit card has also become an attractive source, of revenue for fraudsters. Occurrence of credit card fraud is increasing dramatically due to exposure of security weaknesses. Which results in loss of billions of money every year. Even with the development of modern technology and the global superhighways of communication. Credit card fraud costs human beings and the financial company billions of dollars annually and fraudsters continuously try to find new principles and tactics to commit illegal acts. Fraudsters are now become very dynamic and use sophisticated techniques to perpetrate credit card fraud. The fraudulent activities present challenges to banks and other financial institutions who issue credit cards. Credit card fraud is a huge rising term of fraud involving a purchasing card, such as credit card as a fraudulent source of funds in a transaction. The intent may be to obtain goods without paying or to obtain unauthorized funds from an account. Credit card fraud has been split into two types, i.e. online fraud and offline fraud is committed by using a stolen physical card at call center or any other place. Online fraud is perpetuated via the net, shopping web or in the Absence of the scorecard holder.

In the other case of online fund transfer a user makes use of details such as Login ID, password, card details, OTP and a transaction password. Again, there if the details of the account be misused then as a result, it will give rise to fraud. When a credit card is misplaced or stolen, it may be used for illegal purchase until the holder notifies the issuing bank and the bank puts a block on the account. Still, it is possible for a thief to make an unauthorized purchase on a card before the card is cancelled. Credit card fraud detection is difficult. If a credit card or number is stolen. Credit card frauds events take place frequently and then result in huge financial losses. The Criminal can use some technologies such as Trojan or phishing to steal the information on other people's credit cards. Thus, the fraud detection system has become essential for banks and financial foundation to minimize their losses.

II. LITERATURE SURVEY

In the year of 2017, a lot of research has been done in this field. **T.Kavipriya and N. Geetha [1]** presented "Study on credit card fraud detection using data mining techniques". In this paper comparison of various data mining techniques, such as simple K-means, Hidden Markov Model, Bayesian network, and KNN algorithm is done. Along with these techniques "Hidden Markov Model" optimizes the best solution for the fraud detection.

In the year of 2017, **Suman Kumar and Dr. Abha choubey [2]** presented "A review on various techniques and approaches for credit card fraud detection". This survey has found that there have been three important features that help to make decision models more accurate. They contain an organized analysis, an appropriate selection of data set and a suitable time period of the dataset.

In the year of 2017, **Ritu and Sudesh Nandal [3]** proposed "Credit card fraud detection using GSA". In this paper results are compared with previously used simulated annealing algorithm and proposed method is giving more honest results in term of area under curve of ROC and MSE.

In the year of 2017, **Ruchi Oberoi [4]** proposed "Credit card fraud detection system using Genetic Algorithm". In this paper genetic algorithm is employed to find the fraud which leads to reduction in false alert which leads to generation of efficient result.

In the year of 2017, **B.Pushpalatha and C. Wilson, joseph [5]** describe "Credit card Fraud detection based on the transaction by using data mining techniques''. The Work of this paper highlights the fraud detection improvement that a learning strategy can provide when it is used in conjunction with an established fraud detection system.

In the year of 2018, **T.Kavipriya and N.Geetha [6]** presented "An identification and detection of fraudulence in credit card fraud transaction system using data mining techniques". The result of this paper shows that the proposed method gives better results which helps to obtain high fraud coverage combined with a low false alarm rate than the existing Hidden Markov Model.

In the year of 2018, **G.Suresh and R.Justin Raj [7]** presented "A study on credit card fraud detection using Data mining Techniques". In this paper to get the improved optimal solution genetic algorithm is used and this method is efficient and secure.

In the year of 2008, **Abhinav Srivastava and Amlan Kundu ET. al, [8]** describe "credit card fraud detection using hidden Markov model". In this paper, application of HHM is proposed to credit card fraud detection and accuracy of the system is close to 80 percent.

In the year of 2016, **Nitin B.Khandare [9**] presented "Credit card fraud detection Using Hidden Markov Model". In his paper, the sequence of operations in credit card transaction processing system using a Hidden Markov Model and show how it can be used for the detection of fraud.

In the year of 2018, **Shivangi Sharma and Puneet Mittal et.al [10]** proposed "An approach to detect credit card frauds using Attribute selection and Ensemble Techniques". In this paper working of classification algorithm is used to check fraudulent accounts. The Result shows that impact of bagging, bagging, stacking and voting present the optimal technique for fraud detection.

In the year of 2016, **S. Suganya and N.Kamalraj [11]** proposed "Meta classification technique for improving for improving credit card fraud detection". In this paper, ensemble method based on the D-tree, SVM, KNN and FA are proposed for solving transaction data classification problems.

In the year of 2017, **Archana Gahlaut and Tushar[12]** presented "Prediction analysis of risky credit using Data mining classification models". In this paper , data mining techniques are employed to predict and classify the customer's credit score to overcome the future risks giving loans to clients who cannot give back.

III. TYPES OF FRAUD

Sadly, fraud is all too common in our world today. There are a variety of crimes that may be committed. The most common types of fraud are bankable, health care, Medicaid, credit cards, various insurances, bank fraud, income tax, unemployment and money wire fraud and bank account fraud etc.

1) **Credit card fraud:** when a person or organization tries to use a credit card without the proper authorization for financial gain. Credit card fraud has been divided into two types:
   - **Offline fraud** is the one which involves some physical activity such as stealing purse/wallet, which contains valuables like a credit card, ID proofs etc. and using the crucial information within them.
   - **Online fraud** happens when the fraudster uses an electronic medium or creates a website and presents their website as genuine to obtain crucial personal information and perform illegal transactions on which the fraudsters collect/steal personal information are Hacking, Phishing, spoofing, spyware, Shoulder, Surfing, Dumpster Diving etc.

2) **Bank fraud:** Bank fraud occurs when a person uses illegal means to receive money or assets from a bank or other financial institution. Bank fraud is attempted by a person to obtain money from a bank's depositors by falsified pretending to be a bank or financial institution. There are several ways in which a thief can commit bank fraud. Common types of bank fraud are bank impersonation, stolen checks, fraudulent loans, internet fraud, demand draft fraud, skimming of card information, cheque kiting, credit card fraud etc.

3) **Health care fraud and health insurance fraud:** health care fraud and health insurance fraud came in a variety of forms. Medical equipment fraud, where bills are created for equipment that was never received. Where fake tests are offered and billed to Medicare or insurance companies. Medicare fraud is one of the most common types of healthcare fraud. Medicare fraud wastes a lot of money every year and it results in higher costs. Insurance fraud can occur at many points in the insurance process and can be committed by consumers, agents and insurance company employees, healthcare, agents and brokers, providers and others.

4) **Telemarketing fraud:** telemarketing fraud happens when you are basically asked to act now or send money straight away in order to be able to access some sort of special offer. Telemarketing fraud is purchasing club memberships, charities, fundraising, credit scam, identity theft and medical discounts, etc. Once you are in the trap of telemarketing fraud. Then it is very difficult to get your money back. So, make sure you check who is calling you.

5) **Theft, fraud/ counterfeit fraud:** theft and counterfeit fraud are associated with each other. Theft, fraud refers to the use of a card that isn't yours. As quickly the owner gives information to the bank, the bank will take measures to check the thief as early as possible. Likewise, counterfeit, fraud takes place when the credit card is used remotely, where simplest the credit card details are needed.

6) **Internet fraud:** This is exactly the way sounds internet fraud, happens when a person makes use of the internet as a tool to take benefit of someone else through fraud. The term internet fraud refers to a fraud scheme that uses email, websites, and message to present to conduct fraudulent transactions or transmit the proceeds of fraud to financial

institutions or to others connected with the scheme. Internet fraud includes identity theft, phishing, and internet banking fraud, spam and scams.

7) **Identity fraud:** identity theft is one of the fastest growing crimes now-a-day's in our country, if not in the world. A criminal will take your identity by looking your trash or by taking details by stealing your information through your browser history and they will use this detail to apply for credit card, welfare services, tax refunds, and more. Identity theft could cost your business thousands of dollars. Fraudsters steal your business identity and use it to access your credit. To prevent identity theft, make sure you keep your statements and sensitive information secure.

8) **Mail fraud:** Mail fraud is committed for the purpose of wrongful financial gain, and this crime can be committed against individual, business, the government, and financial institutions.

9) **Fraudulent Loans:** One way to remove money from a bank is to take a loan, a fraudulent loan, then the "borrower" do bankruptcy or vanishes and the money is gone. The borrower may even be a non-live person.

10) **Cheque Fraud:** Most common cases of this kind of fraud are through stolen cheques and fraud signatures.

IV. CREDIT CARD FRAUD VARIENTS

1) **Fake card:** card which is not authorized or not issued by financial institutions is termed as fake cards. Fake cards are developed by skimming the actual data of genuine card which was swiped over an electronic data capture machine (EDC). This data is encoded from the magnetic strips and later used to create fake cards.

2) **Stolen/Lost cards:** A scenario where a card holder accidentally loses his card or his card has been stolen, if the cardholder fails to report it to the concerned bank there might be chances that the card can be misused by a criminal.

3) **ID theft:** When an attacker obtains the personal information of a victim such as date of birth, gender, email id, he can easily get access to a new account using victim details or even a step further by taking hold of the existing account.

4) **Card not present (CNP) Fraud:** CNP fraud is a type of fraud where the criminal requires minimal information such as card number and expiry date. In such position, the card need not be present while making the purchase online.

5) **Friendly fraud:** In friendly fraud the actual cardholder himself makes the purchase and pays for the services by using payment card such as credit/debit card. Later reports a complaint stating loss of the payment card and claims for reimbursement.

6) **Affiliate fraud:** It is the most widely distributed fraud where either an individual logs into a site or makes purchase using a fake account or a program is designed to carry out fraud activities.

7) **Triangle fraud:** Such fraud mainly involves 3 steps: (a) creating a fake website (b) providing offers such as prompt delivery upon the credit card payment mode (c) Stolen or fake cards are utilized to produce the payments and the name obtained at the real store is misused by the criminal to later ship the product to the customer.

8) **Account Takeover:** This type of fraud takes fraud when a fraudster illegally obtains the valid customers personal data. The fraudster takes control of legitimate account by providing the customer's account number or by providing the card number.

9) **Phishing:** Phishing is the process of collecting your personal information through e-mail or websites. You may receive an email that directs you to a page that looks similar to an official website and asks you to update your sensitive information. Such as usernames, passwords, and credit card numbers, that results in identity theft and financial loss.

10) **Skimming:** Most cases of counterfeit fraud involve skimming, a process where real data on a card's magnetic stripe is electronically copied onto another. Skimming is fast emerging as the most popular form of credit card fraud.

11) **Spoofing:** Spoofed emails request personal information and may appear to be from a known sender. Such emails request the recipient to reply with an account number for verification. The email spoofed, then uses this account number for identity theft purposes, such as accessing the victim's bank account, changing contact details.

12) **Application fraud:** when someone applies for a credit card with theft information that is termed as application fraud. To detect application fraud, two different methods have to be classified. When application come from a same user with the same details that is called duplicates, and when application come from different individuals with similar details that is termed as identity fraudsters.

V. ADVANTAGES AND DISADVANTAGES OF CREDIT CARD

ADVANTAGES:

1) **Quick Way to Borrow:** If you need to buy something expensive and you can't afford to pay for all at once, a credit card is ideal. If you don't have the cash at hand or even in your bank account, you can pay with a credit card and then spread

the cost over a number of months. Credit cards are also an easy and secure way to pay for internet shopping plus, they are widely accepted around the world.

2) **Consumer Protection:** You get more protection if you pay with a credit card than a debit card, cash or cheque. Because if the of the company goes bust or your purchase is faulty or doesn't turn up, you won't lose out because you can claim the money back from your credit card provider.

3) **Card – use Incentives:** Some credit cards offer 0% periods of interest free loan. You need to clear your balance before the 0% offer ends though otherwise you'll be charged interest. Some cards, even offer incentives to spend, such as cash back, loyalty points or air miles, which means you could actually make money from your credit card. These are only worthwhile if you pay your bill in full otherwise. The interest you'll be charged will be more than the value of the rewards.

DISADVANTAGES:

1) **Blowing your Budget:** The greatest disadvantages of credit card yield off your balance each month. Which misbalance your budget, and at the time of return, you don't have any money and company charge you interest each month that you have adopted.

2) **Bad credit score:** victims, unable to receive loans.

3) **Indebtedness:** A victim becomes heavily indebted sometimes bankrupt because of credit card fraud.

VI. STRATEGIES TO OVERCOME CREDIT CARD FRAUD

1) **Privacy:** Instituting, in public areas, private spaces where one can safely carry out a transaction using credit cards.

2) **Magnetic wallets:** Persons can invest in magnetic wallets that prevent the scanning of credit card information by blocking the signal.

3) **Proper Identification:** Proper identification of persons can avail in the reduction of credit card fraud. This cuts down the possibility of credit card fraud.

4) **Adequate surveillance:** constant monitoring or surveillance of places where credit card fraud occurs most often. Hence, if fraud were to occur, the suspect could easily be seen.

5) **Prevention:** Truthfully, if people were more responsible and careful with how they handle their credit card and their credit card information, it would be harder for fraudsters to get information.

6) **New account screening:** Ensure that institution employees thoroughly check and ensure that information is accurate. Before issuing a new credit card.

7) **Keep your credit cards safe:** One of the most elementary ways to avoid credit card fraud is by holding your credit cards safe from thieves. Put your credit cards in a bag or wallet close to your body where it can't easily be snatched away.

8) **Don't Sign Blank credit card receipts:** Always verify the amount on your credit card receipt before signing it. If you get a credit card receipt that has blank spaces in it, write $0 in those spaces or get through them before putting your signature on the card. Other than the cashier could write in an amount and send the purchase to your credit card issuer.

9) **Be Safe with your credit card Online:** Don't click on email links from anyone that faces like your bank, credit card company, or other business who uses your personal data, even if the email looks legitimate. These connections are often phishing scams and the scammers want to trick you into entering your login information on their fake website. Alternatively, go directly to that business's website to login to your account.

10) **Report lost or stolen credit cards immediately:** Report missed lost or stolen credit card as soon as possible lowers the likelihood that you'll suffer to concentrate to pay for any fraudulent charges made on your credit card. Write down credit card Company's customer service number now so you'll have them if you credit cards are ever lost.

11) **Review your billing statements each month:** unauthorized charges on your credit card are the foremost sign of credit card fraud. If you notice a charge you didn't make, no matter how small, report the charge to your credit card issuer directly. Your credit card issuer will tell you whether you should close your account and start a new account number to avoid credit fraud.

12) **Make strong password and keep them safe:** your credit card number may be stored in a number of places online. For example, you may save your credit card detail on Amazon so you can make one-click purchases. Make certain you use strong passwords with a combination of upper-and lower-case characters, numbers, and even characters, and avoid writing or sharing your password.

13) **Check ATM for credit card Skimmers:** Credit card thieves sometimes place credit card skimming devices onto the credit card readers at ATMs. These skimmers captures and store your credit card information and credit card thieves come back to find the device. Skimmers are placed on the regular credit card swipe, then if anything seems off about the place you're swiping your credit card, go to another ATM.

VII. VARIOUS DATA MINING TECHNIQUES FOR CREDIT CARD FRAUD DETECTION SYSTEM

In credit card fraud detection there are many techniques, here we represent classification method.

CLASSIFICATION

Data mining consist a number of techniques which are used to mine appropriate and interesting knowledge from information. Classification is the most frequently applied data mining procedures, which applies a lot of pre-classified cases. The primary goal of a classification is to maximize the predictive accuracy obtained by the classification model. Classification technique can be considered as a supervised technique where each instance belongs to a class. There are several model techniques are used for classification some of them are:

1) Decision Tree
2) K-Nearest Neighbor
3) Support vector Machines
4) Naïve Bayesian Classifiers
5) Neural Network

1) Decision Tree

The Decision tree is an analytical model with a hierarchy or tree structure. Where each node denotes a test on an attribute value, each branch represents an outcome of the test and tree leaves represent classes or class distribution. Decision trees partition the input space into cells where each cell belongs to one class. The partitioning is represented as a sequence of tests. Each interior node in the decision tree tests the value of some input variable, and the branches from the node are labeled with the possible results of the test. The leaf node represents the cells and define the class to come back if that lead node is reached. The classification of a specific input instance is thus performed by starting at the roof of a node, and depending on the results of the tests, following the appropriate branches until a leaf node is reached.

2) K-Nearest Neighbor

KNN **method** differentiates the classification of unidentified data point on the basis of its closest neighbor whose class is previously identified. K-nearest neighbor algorithm is in which nearest neighbor is calculated along the basis of inference on K that designates the number of nearest neighbors to be measured to portray class of a sample data point. More than one closest neighbor is used to identify the class which is given data points. The samples of data that are utilized should be present in memory at run time. These data samples are allocated with weights as per their distance from sample data. When given an unidentified sample, a K-nearest neighbor classifier investigates the pattern space for the K training samples that are closest to the unidentified sample. Closeness is defined in terms of Euclidean distance.

3) Support Vector Machines

SVM is a really effective method for regression, classification and general pattern recognition. It is considered a good classifier because of its high generalization performance without the need to add a priori knowledge, even when the dimension of the input space is very high. It is considered a good classifier because of its high generalization performance without the need to add a priori knowledge, yet when the dimension of the input space is very high. For a linearly separable dataset, a linear classification function corresponding to a separating hyper plane that passes through the middle of the two classes, separating the two. SVMs were initially developed for binary classification, but it could be efficiently extended for multiclass problems.

4) Naïve Bayesian Classifiers

This technique is named as naïve because it intelligently takes the liberty of attributes specified the class. After that classification is performed by applying Bayes rule to check the probability of the correct class. Naïve Bayes is a type of classifier which uses the Bayes Theorem. It estimates membership probabilities for every class, such as the probability that gives record or data point belongs to a particular class.

5) Neural Network

Neural network or an artificial neural network is a biological system that finds patterns and makes predictions. The powerful predictive modeling technique creates very complex models that are really difficult to understand even by experts. Artificial neural networks have become a powerful tool in tasks like pattern recognition, decision problem and prediction application. So this can be used in the crime branch in predicting the next crime and even predict the plan of criminals and reduce the crime. This analytical network will also be useful in fraud detection and also in the other management sector.

ADVANTAGES AND DISADVANTAGES

Table 1: Advantages and Disadvantages of Data Mining Techniques

TECHNIQUE	ADVANTAGES	DISADVANTAGES
Decision Trees	Easy to interpret. Can handle missing both character and numeric data. Can handle missing values and errors. Working with continuous attribute. Robust.	Not powerful to handle complex data. Need data in refining form Classification.

K-Nearest Neighbor	Effective if training data is large.	Need to determine values of parameters.
Support Vector Machines	High accuracy. Popular in text classification. Useful for nonlinearly separable data. It has a regularization parameter.	Computationally expensive, thus runs slow.
Naïve Bayesian Classifiers	Simple. Needless training data. Perform well.	Dependency between variable. Totally depend on selection of parameters. The consistent accuracy of Naïve Bayesian only gets with large datasets.
Neural network	Easy to use and compare. Non-parametric. Solve complicated problems. Can handle complex data. Ability to learn itself. Less training time. Effectiveness in dealing with noisy data.	Very slow to train. Require lots of power. A slow process. Black box approach. Hard to interpret for human. Avoid model over fitting.

VIII. RESULTS

Table 2 gives a review of research papers using different data mining tools, techniques and languages and the results in form of inference of those research papers. The techniques used are Decision Tree, K-Nearest Neighbor, Support vector Machines, Naïve Bayesian Classifiers, Neural Network and tools/languages used are WEKA, Python, Rattle and MATLAB.

Table 2: Comparison based table on Data Mining tools, techniques and inference.

S.no	Author	Year	Paper Name	Technique	Tool/Lang uage	Inference
1	Anita jog, Anjali et,al.	2018	Implementation of credit card fraud detection system with concept Drifts Adaptation	Drift adaptation	WEKA	The Result shows that this model is dynamic with 80%, fraudulent transaction filtering rate.
2	Sylvester man langit,Sami Azam	2018	An efficient method for detecting fraudulent transaction using classification algorithms on an Algorithm dataset	Random forest KNN Logistic regression Naïve Bayes	WEKA	Result show that the KNN algorithm showed the highest recall accuracy compared to the other algorithm with 98.32%.
3	Johno. Awoyemi, Adebayo. ndetunmbi et.al	2017	Credit card fraud detection using machine learning	Naïve Bayes KNN Logistic Regression	Python	Experiment shows that the KNN shows significant performance for all metrics with 97.92%.
4	Priyanka kumara, Smita prava mishra	2017	Analysis credit card fraud detection using fusion classification	Ensemble classifier Single classifier	WEKA	Result shows that classification via regression ensemble classification technique performed well with accuracy of 95.2%.
5	Archana Gahlaut, Tushar,prin ce kumar ingh	2017	Prediction analysis of risky credit using the data mining classification model	Decision tree Random forest adaptive boosting SVM linear regression neural network	Rattle	Result shows that random forest is the most prominent algorithm for building good prediction classification model.

6	Ritu, Sudesh Nandal	2017	Credit card fraud detection using GSA	GSA and neural network	MATLAB	The result how that this strategy provide improvement in credit card with conjunction of neural network.
7	Anusorn charleonna n	2016	Credit card fraud detection using RUS and MRN algorithm	RUSMRN RUSBOOT ADA BOOST Naïve Bayes	MATLAB	The result shows that RUSMRN is appropriate for predicting the data because it has the best classification performance in term of accuracy and sensitivity with 79.73%.
8	S.suganya, N.Kamalraj	2016	Meta classification technique for improving credit card fraud detection	D-Tree SVM KNN Firefly (ensemble)	WEKA	Result shows that ensemble method is able to optimize solution with a 0.004% error rate.
9	Nitin B. Khandare	2016	Credit card fraud detection using Hidden Markov model	Graph based clustering	HMM	Result shows that HMM makes the processing of detection very easy and tries to remove the complexity
10	Tanmay kumar behera, suvasini pani grahi	2015	Credit card fraud detection: a hybrid approach using Fuzzy clustering network	Fuzzy clustering and neural network	MATLAB	The Result shows that this is the appropriate approach for real world credit card fraud detection problem with 93.90%correctly classified transaction and 6.10% incorrect transaction.

IX. CONCLUSION

These days one of the biggest threats in e-commerce, banks and commercial institutes is fraud in credit cards. This paper has been presented a survey on various data mining tools and technique in credit card fraud detection through various research papers. This survey has been found that the performance and effectiveness of classification are the best for credit card fraud detection by using a single classification technique or through an ensemble classification technique. Comparative studies reveal that the Accuracy of the KNN classifier is close to 98.32% as compared to other techniques.

Basically, classification and prediction assignment are very important in the credit card process. Therefore, data mining has been chosen to use in every activity of the credit card process by the credit card provider. Therefore, more importantly, there many credit card providers are interested in finding methods which can help them to reduce costs as well as increase profit. Such technique 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 transaction. Ultimately, this prevents the banks and customers from huge losses and finally leading to reduction of risk.

REFERENCES

1.T.Kavipriya,N.eetha,"Study on credit card fraud detection using data mining technique", "International Journal of Contemporary Research in computer Science and technology(IJCRCST)," Volume 3, Special Issue 3 (September' 2017)

2.Suman Kumari,Dr. Abha Choubey,"AReview on various technique and approach for credit card fraud detection", "International Journal of Scientific Research Engineering & Technology (IJSRET),ISSN 2278-0882"Volume 6,Issue 5,May 2017

3.Ritu,Sudesh Nandal,"Credit card Fraud Detection Using GSA", "International journal of scientific Research in computer science, Engineering and information Technology "ISSN:2456-3307" Volume 2,Issue 3,2017 IJSRCSEIT

4.Ruchi Oberoi,"Credit- card fraud Detection system: using Genetic Algorithm", "International journal of computer & mathematical Sciences IJCMS",ISSSN 2347-8527nVolume 6,Issue 6 June 2017

5.B.Pushpalatha, .Willson Joseph, "Credit card fraud detection Based on the Transaction by using Data mining Techniques", "International Journal of Innovative Research in computer and communication Engineering", Vol.5,Issue 2, February 2017

6.T.Kavipriya, N.Geetha,"An identification and detection of fraudulence in credit card fraud transaction system using data mining techniques", "International Research journal of engineering and technology (IRJET)", e-SSN: 2395-0056 P-ISSN: 2395-0072 volume:05 issue: 01 jan-2018

7.G.Suresh, R.Justin Raj,"A study on credit card fraud detection using data mining techniques", "International journal of data mining technique and application", volume:07,issue:01,june2018

8.Abhinav srivastava, Amlan kundu et, al. "Credit card fraud detection using Hidden Markov Model", "IEEE transactions on dependable and secure computing, vol.5 no.1, January-march 2008

9.Nitin B.Khandare,"Credit card fraud detection using Hidden Markov Model", "International journal of advance scientific research and engineering trends" volume1 issue 4 july 2016

10. Shivangi Sharma,Puneet Mittal et,al."An Approach to Detect credit card frauds using Attribute Selection and ensemble Techniques", International journal of computer Application Volume 180-No.21, February2018

11. S. Suganya,.Kamalraj,"Meta classification technique for improving credit card fraud detection", "International journal of scientific and technical advancements", Volume 2,issue1,pp.101-105,2016.

12. Archana Gahlaut, Tushar, "prediction analysis of risky credit using data mining, classification models", IEEE-40222,8th ICCCNT 2017 July 3-5 2017, IIT Delhi,India