Engineering Universe for scientific Research and management
ISSN (Online): 2319-3069
Vol. XIV Issue XI
November 2022

An Analysis of Various Methods for Detecting Credit Card Fraud

Kishan kumar[1], Chetan Agrawal[2], Prachi Tiwari[3]
Dept. of CSE, Radharaman Institute of Technology & Science, Bhopal, India[1, 2, 3]
rajv28149@gmail.com[1], chetan.agrawal12@gmail.com[2], prachi.38@gmail.com[3]

Abstract
The rapid expansion of credit card use in today's society makes security a top issue all the time. Increased credit card use also results in an increase in credit card scams, such as the theft of money from credit cards and online money speculation, among other things. Therefore, in order to overcome this problem, businesses invest a great deal of money and time into finding these con artists or other unauthorized users. In this study, we will discuss the classification methods that may be applied to credit card datasets to identify credit card fraud. Fraud avoidance and fraud discovery systems are the two main ways to prevent frauds and the losses brought on by fraud. Fraud prevention is a realistic strategy used to reduce the frequency of fraud. When criminals go beyond the fraud prevention plan and start a fraudulent transaction, fraud discovery systems become relevant. The acceptance of the prevention mechanism by a fraudulent transaction is impossible to discern. Therefore, the goal of the fraud detection method is to make sure that every transaction has the potential to be fraudulent despite the fraud prevention method, as well as to identify fraudulent ones as soon as is reasonably possible after the fraudster has started to commit a fraudulent transaction.

Keywords: *Credit card fraud, Online Money Transfer, Card Scam, Bank fraud, Cyber Security.*

1. Introduction

Currently, the credit card corporation has been facing on the crisis of money moreover debt lying on credit cards. Furthermore, this incorrect action is expected to have the high ratios through the basis of the efforts used for the market shares rising from the credit card along with the money issuer banks. Therefore, it must have the effort to discover technique to reduce the losses from credit scheme at nearly all. As well, if it gains the fatalities, these companies are the affect ones through the direct effect to the company process as well as reason the financial crisis from the incorrect prediction of eminence up for customer payment. [1] Here we will attempt to locate out fraud transaction of credit card by unusual classifiers used within machine learning algorithm. Whereas performing online transaction by a credit card issue through bank, the transaction can be also Online Purchase or else transfer .The online get can be done by the credit or else debit card issued through the bank or else the card based purchase is able to classify into two categories Physical Card along with Virtual Card. In mutually the cases if the card or else card facts are stolen the impostor can simply carry out fraud transactions which will outcome in considerable loss to card holder or else bank. In the case of Online Money Transfer a user create use of particulars such as Login Id, Password along with transaction password. Yet again here if the facts of the account be overlook used then, as an outcome, it which will provide increase to scam transaction. Credit card fraud is an inclusive term for theft as well as fraud dedicated using a credit card or else any like payment method as a fraudulent basis of money. The point could be to get goods with no paying, or else to get prohibited funds from an account. Credit card fraud is as well an accumulation to individuality theft.

Credit card scam is also an accessory toward identity theft. Card scam start either through the robbery of the physical card or else by the cooperation of data linked through the account, include the card account numeral or else other information or data that would regularly as well as essentially be accessible to a merchant throughout a genuine transaction. The cooperation can occur through a lot of common routes a long with can generally be conduct with no tip off the cardholder, the commercial, or the issuer at least awaiting the account is eventually used for scam. An uncomplicated instance is that of a store clerk repeat sales receipt intended for later use. The quick expansion of credit card make use of on the internet has completed database security lapse generally costly; in a few cases, millions of accounts are compromised [4]. Stolen cards can be report rapidly through cardholders, other than a compromise account is able to be notice through a crook for weeks or else months earlier than any fraudulent exercise, creation it not easy to recognize the source of the cooperate. The cardholder might not find out fraudulent utilize until getting a billing declaration, which may be convey uncommonly.
Here, figure 1 represents the transactions in sequential manner firstly these transactions that are hold up with

some credit cards be accepted through the essential information. These transactions is promoted to "Credit Card Fraud Detection System"; the keep count achieve from "Credit card Fraud Detection System" is more used to recognize or choose subsequently action to be in use. Here, this is the decision making step to check; If the transaction is known as authentic operation, then it is send to intended for advance processing of approval or clearance on another hand if the transaction is known as fake transaction, then vigilant or alarm is raise toward emphasize for the same as well as is stopped beginning more processing of that operation or transaction.

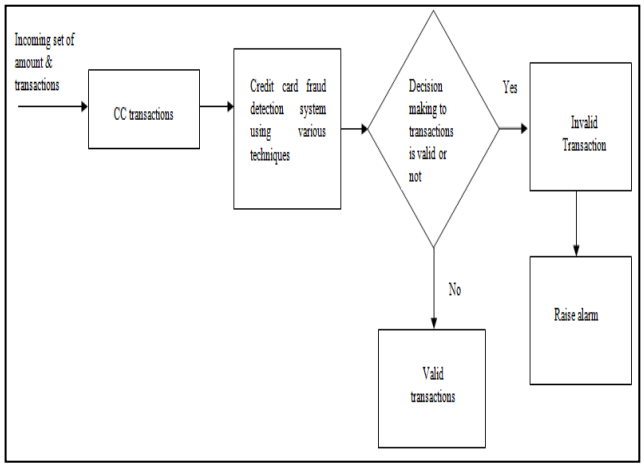

Fig. 1: Block diagram of credit card fraud detection system.

Rest of the paper is organized as follows, in section 2 describes that the types of credit card fraud. The section 3 represents the literature reviews along with lots of researchers perform on that domain of fraud detection of credit cards. The segment 4 encloses the discussion of problem statements in credit card fraud detection. The segment 5 concludes the research along with last suggestions for future scope followed by references used in this paper.

2. Credit Card Fraud

Credit card fraud has been isolated into two sorts: Offline fraud as well as On-line fraud. Offline fraud is conferred by utilizing a stolen physical card at call focus or some other place. On-line fraud is conferred through internet, telephone, shopping, web, or without card holder.

- **Telecommunication Fraud**

The utilization of media transmission is administrations to confer different types of fraud. Shoppers, organizations and communications specialist co-op are the casualties.

- **Manual Credit or Electronic Card Imprints**

Another type of credit card fraud is knowledgeable during credit card imprints. Their ways to someone skim information with the aim of located lying on the magnetic stripe of the card. It is then use to instruct a false card or else to whole fake transactions.

- **CNP (Card Not Present) Fraud**

If someone knows the ending date along with account digit of your card, they could assign CNP fraud aligned with you. This could be complete through mail, phone, or internet.

- **Doctor Cards**

A doctor card is like a normal card whereby a robust magnet has remove its metallic strip. Criminals execute this along with then handle to modify the details lying on the card itself therefore they go with those of suitable cards. Obviously, this card would not work while a criminal try toward pay intended for something.

- **Computer Intrusion**

Intrusion Is Defined As The demonstration of entering without warrant or welcome; That signifies "potential plausibility of unapproved endeavor to get to Information, Manipulate Information Purposefully. Interlopers might be from any condition, a outsider (Or Hacker) and an insider who knows the format of the framework [1].

- **Bankruptcy Fraud**

This section centers on bankruptcy fraud. Fraud implies utilizing a charge card while being truant. Bankruptcy fraud is a standout amongst the most muddled kinds of fraud to predict [1]. In this area, we center on robbery and fake fraud, which are identified with one other. Robbery fraud alludes utilizing a card that isn't yours. When the proprietor give some criticism and contact the bank, the bank will take measures to check the criminal as right on time as could be allowed. Similarly, fake fraud happens when the MasterCard is utilized remotely; where just the Visa points of interest are required [2].

- **Application Fraud**

When somebody is applies for a credit card with false data that is named as application fraud. For identifying

application fraud, two distinct circumstances must be characterized. At the point when applications originate from a same client with similar subtle elements, that is called copies, and when applications originate from various people with comparative points of interest, that is named as character fraudsters. Phua et al. [3] portrays application fraud as "exhibition of character wrongdoing, happens when application shapes contain conceivable, and manufactured (personality fraud), or genuine yet additionally stolen personality data (wholesale fraud)".

3. Literature Survey

As indicated by an A. C. Nielsen consider directed in 2005 one-tenth of the total populace is shopping online. In same investigation it is likewise specified that credit cards are most mainstream method of online installment. In US, it is discovered that aggregate number of credit cards from the four credit card organize (Master Card, Discover, VISA, and American Express) is 609 million and 1.28 billion credit cards from over four essential credit card systems in addition to some different systems (Store, Oil Company and other). On the off chance that think about the insights of credit cards in India, it is discovered that aggregate number of credit cards In India toward the finish of December-31-2012 is around 18 to 18.9 million [1]. In the event of multinational banks, the utilization or normal adjust, per borrower for credit card holder has ascend from Rs. 61,758 out of 201 1 to Rs. 82,455 out of 2012. In a similar period, private bank clients' use ascends from Rs. 39,368 to Rs. 47,370 [1]. As the quantity of credit card clients expands around the world, the open doors for fraudster to take credit card points of interest and, consequently, submit fraud are additionally grown up.

Agrawal, [2] try to develop a framework for `Credit Card Fraud Detection'. Credit Card can be recognized for each online and offline these days. They imparted the mix of procedures. Essentially, Shopping Behavior relies upon which kind of things customer buys. Also, Spending Behavior in this the fraud is recognized in perspective of the best whole spent. Thirdly, Hidden Markov Model in this system profiles are kept up and measurements of a particular customer and bits of knowledge of different fraud circumstances are grouped. Genetic Algorithm is used for figuring of threshold and corrects frauds. Finally typical is taken out by summing the result. The central errand of this investigation work is to examine various viewpoints of a comparative issue and see what can be picked up from the use of every one of a kind technique.
John Shafer et al. [6] exhibit another decision-tree-based classification algorithm, called SPRINT that expels the greater part of the memory limitations, and is quick and adaptable. The algorithm has likewise been intended to be effortlessly parallelized, enabling numerous processors to cooperate to manufacture a solitary predictable model. This parallelization, additionally displayed here, shows great adaptability also. The mix of these qualities makes the proposed algorithm a perfect apparatus for data mining. The tree leaves are comprised of the class marks which the data things have been gather [6]. In this strategy Credit Card scam detection through algorithm intended for Decision Tree Learning.

Ray-I Chang et al. [7] Fraud identification techniques in light of neural network are the most famous ones. An artificial neural network [7] comprises of an interconnected gathering of artificial neurons .The guideline of neural network is convinced by the elements of the brain particularly design pattern recognition as well as associative memory [8]. The neural network perceives comparable patterns, predicts future qualities or occasions in light of the associative memory of the patterns it was found out. It is generally connected within classification as well as clustering. The benefits of neural networks over other systems are that these models can gain from the past and in this manner, enhance comes about as time passes.
Siddhartha Bhattacharyya et. al. presented two propelled data mining approaches, random forests and support vector machines, together with the logistic regression [9], as fraction of an endeavor to better distinguish (and in this manner control and indict) credit card scam. The examination depends on genuine data of transactions from a universal credit card activity. It is surely known, simple to utilize, and stays a standout amongst the most regularly utilized for data-mining by and by. It subsequently gives a valuable benchmark to looking at execution of more up to date techniques. Supervised learning strategies for fraud discovery confront two difficulties. The first is of uneven class sizes of true legitimate along with fraudulent transactions, with legitimate transactions far dwarfing fraudulent ones. For demonstrate improvement, some type of sampling among the two classes is regularly used to acquire preparing data with sensible class disseminations. Different sampling approaches have been proposed in the writing, with random oversampling of minority class cases and random under sampling of larger part class cases being the least complex and most basic being used; others incorporate coordinated sampling The second issue in creating supervised models for fraud can emerge from possibly undetected fraud transactions, prompting mislabeled cases in the data to be utilized for building the model. With the end goal of this examination, fraudulent transactions are those particularly recognized by the institutional inspectors as those that caused an unlawful exchange of assets from the bank supporting the credit cards. These transactions were seen to be fraudulent ex

post. Our examination depends on genuine data of transactions from a universal credit card activity. The transaction data is collected to make different inferred qualities.

Abhinav Srivastava et al [10]; In this technique, they model the series of functions inside credit card transaction giving out by a Hidden Markov Model (HMM) along with illustrate how it can be use for the discovery of scam Transaction. An HMM is firstly trained by the normal actions of a cardholder.

S. Ghosh et. al. [11]; In this strategy creator utilize data from a credit card guarantor, a neural network based credit card fraud discovery framework was prepared on an extensive example of named credit card account transactions and tried on a holdout data set that comprised of all record movement over a consequent two-month of time. The neural network was prepared on cases of fraud due to stolen cards, application fraud, lost cards, fake fraud, and mail-arrange fraud. The network identified fundamentally more fraud accounts (a request of extent more) with essentially less false positives (lessened by a factor of 20) over run based fraud recognition methods.

V. Dheepa [12] these techniques to identify fraud are introduced. Initially, clustering model is utilized to characterize the lawful and fraudulent transaction utilizing data clusterization of areas of parameter esteem. Furthermore, Gaussian blend show is utilized to display the probability thickness of credit card client's past conduct so the probability of current conduct can be ascertained to recognize any anomalies from the past conduct. In conclusion, Bayesian networks are utilized to depict the measurements of a particular client and the insights of various fraud situations.

Kunal Goswami, Younghee et. al. [13] planned feature set with comparisons of it alongside the state-of-the-art attribute sets within detecting scam. The attribute set consider the user's social contact lying on the Yelp platform to decide if the user is commit fraud. He accomplished his work through computing F1 attain obtained by neural networks is lying on par with everyone the well known technique for detect scam, a worth of 0.95. The efficiency of the attribute set is within rivaling the further approaches to scam detection.

Masoumeh Zareapoor et. al. [14] talks about how a variety of classification techniques works during credit card scam discovery on the base of error or confusion matrix parameter. A few of the donation of the authors within the region of credit card scam detection is as specified below in table 1.

Table 1: Various Methods for Credit Card Fraud Detections

Authors	Methods	Outcomes	Limitations
Kunal Goswami et. al. [14]	Neural Network	Calculated F1 score method.	To be extend feature set
Masoumeh Zareapoor et. al. [13]	Classification methods	Calculated confusion matrix and precision recall of the classification algorithm.	Should be work on another classifiers
Rinky D. Patel et.al. [15]	Genetic Algorithm	Optimizing the fraud detection solution	accuracy
Avinash Ingole et.al. [16]	HMM/Clustering algorithm	Fraud detection using spending profile	Need to improve HMM
Joseph Pun et. al. [17]	Meta learning strategy and meta learning algorithm	Improvement in catching fraud through neural network.	Only used Meta classification strategy
V. Dheepa et. al. [12]	Decision Tree/Hunts Algorithm	Fraud detection by tracking email and IP	Develops clustering methods for real fraud detection

4. Problem Statement

In this work the standard issue is to integrate display past credit card operation, so we can look at the past transactions which are finished up being fraud. Our work will be utilized to differentiate whether another transaction is fraudulent or else not. Our attention will be lying on to identify the fraudulent transaction totally as well as limit the incorrect fraudulent classification.

5. Conclusion

Credit card scam is an umbrella word for theft and fraud committed with regard to a payment card, such as a debit or credit card, as a fictitious source of funds during a transaction. The goal could be to obtain things without paying for them or to obtain monies that are not permitted from a financial credit. By routinely checking their accounts to ensure constant alertness in case there are any suspicious, unidentified transactions or other activity, cardholders can reduce the risk of fraud. In this study, we gave an outline of the classification algorithm, and in future work, we'll explain how each classification method works and how it will be executed if we combine any two classification algorithms. The purpose of credit card fraud detection in the future is to compare our suggested method to the current one and show why it is preferable. We have previously examined the connection between different classifiers, including SVM, Naive Bayes, and K-NN; however, in the future, further approaches such as Random Forest and Neural Network will also show the consolidated method.

References

[1] Avinash Ingole, Dr. R. C. Thool, " Credit Card Fraud Detection Using Hidden Markov Model and Its Performance," International Journal of Advanced Research In Computer Science and Software Engineering (IJARCSSE), vol. 3, 6 June 2013.

[2] A. Agrawal, S. Kumar and A. K. Mishra, "Credit Card Fraud Detection: A case study," 2015 2nd International Conference on Computing for Sustainable Global Development (INDIACom), New Delhi, 2015, pp. 5-7.

[3] Clifton Phua, Member, IEEE, Kate Smith-Miles, Senior Member, IEEE, Vincent Cheng-Siong Lee, and Ross Gayler, "Resilient Identity Crime Detection", IEEE TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING, VOL. 24, NO. 3, MARCH 2012

[4] Dr R. Dhanapal, Gayathiri. P, " Credit Card Fraud Detection Using Decision Tree For Tracing Email And Ip," International Journal of Computer Science Issues (IJCSI) Vol. 9, Issue 5, No 2, September 2012.

[5] Hunt, E.B., Marin. and Stone,P.J. (1966). Experiments in induction, Academic Press, New York.

[6] Shafer, J., Agrawal, R., and Mehta, M. (1996). Sprint: A scalable parallel classifier for data mining. Proceedings of the 22nd international conference on very large data base. Mumbai (Bombay), India

[7] Ray-I Chang, Liang-Bin Lai, WenDe Su, Jen-Chieh Wang, Jen-Shiang Kouh "Intrusion Detection by Backpropagation Neural Networks with Sample-Query and Attribute-Query". Research India Publications; (2006). (6-10).

[8] Raghavendra Patidar, Lokesh Sharma "Credit Card Fraud Detection Using Neural Network". International Journal of Soft Computing and Engineering (IJSCE), (2011). Volume-1, Issue; (32-38).

[9] Siddhartha Bhattacharyya, Sanjeev Jha, Kurian Tharakunnel, J. Christopher Westland, "Data mining for credit card fraud: A comparative study", Decision Support Systems 50 pp. 602–613,2011.

[10] Srivastava, Abhinav, Kundu, Amlan, Sural, Shamik and Majumdar, Arun K., (2008) "Credit Card Fraud Detection Using Hidden Markov Model", IEEE Transactions on Dependable and Secure Computing, Vol. 5, No. 1, pp. 37-48.

[11] S. Ghosh and D.L. Reilly, "Credit Card Fraud Detection with a Neural-Network," Proc. 27th Hawaii Int'l Conf. System Sciences: Information Systems: Decision Support and Knowledge Based Systems, vol. 3, pp. 621-630, 1994.

[12] V. Dheepa and R. Dhanapal, "Analysis of Credit Card Fraud Detection Methods," international J. Recent Trends Eng., vol. 2, no. 3, pp. 126–128, 2009.

[13] Kunal Goswami, Younghee Park and Chungsik Song, "Impact of reviewer social interaction on online consumer review fraud detection", Journal of Big Data, DOI 10.1186/s40537-017-0075-6, 2017.

[14] Masoumeh Zareapoor and Pourya Shamsolmoali, "Application of credit card fraud detection using ensemble classifier", International conference on general computing, Procedia Computer Science 48 (2015) 679 – 685

[15] Patel, Rinky D., and Dheeraj Kumar Singh. "Credit card fraud detection & prevention of fraud using genetic algorithm." International Journal of Soft Computing and Engineering (IJSCE) ISSN (2013): 2231-2307.

[16] Ingole, Avinash, and Dr RC Thool. "Credit card fraud detection using Hidden Markov Model and its performance." International Journal of Advanced Research in Computer Science and Software Engineering 3, no. 6 (2013): 626-632.

[17]. Lawryshyn, Yuri. "Joseph Pun." Computing 5, no. 1 (2008): 37-48.