

Advance Hidden Markov Model for Credit Card Fraud Detection

ABSTRACT: Credit Card is a chip based digital plastic card issued to user to perform digital transaction based on customer's credit value. This is digital money transaction technique can consider as small scale loan for digital transaction. Credit card is also known as "Plastic Money". It provides facility for its holder to utilize services and goods from the merchant source. With the growth in e-commerce applications, everything is available easily, several benefits can be achieved using credit card. Security is the major concern which affects customer, merchant and bank. Due to digital transaction medium it is vulnerable for several security threats. To protect such digital transaction and detect occurred fraud this work has developed a modified hidden Markov model based fraud detection technique to extract suspected transactions. The aim of this paper is to explore survey of recent work and proposed solution to overcome issue of hidden Markov model.

Keywords: Credit card; Credit Card fraud; Hidden Markov Model; Customized algorithm; Credit card fraud detection; Credit card fraud prevention

1. INTRODUCTION:

The documentation works on the topic "Advance Hidden Markov Model for Credit Card Fraud Detection". Study of work describes the simulation approach for privacy of credit card from fraud. Diagnosing and detection of frauds for credit card is described for the prevention of digital plastic cards.

Today's generation widely uses credit card as a financial product. It is mostly used by individuals to borrow money online till the line of limit of card and user have to pay back the borrowed money every month. Some small amount of interest is charged which should be payed by user. Overall amount have to be payed by the customer every month. However, if the amount is not payed on time then it results in falling of card holder into a credit card obligation. It use and convenience benefits user to borrow some money at the time of requirement. It comes up with various beneficial features for users like rewarding points. Credit card is used to pay bills, fuel surcharge and even different utility bills.

When talking about data mining for this process, it is used for making patterns by analyzing data using essential information. This information is beneficial in enhancing revenue, decrease cost etc. In this few years, crime detection is identified using data mining process. Identifying crime and fraud is the general process which is identified in this paper.

Different types of fraud deception are: Synthetic identity fraud and Real identity fraud.

1. Synthetic identity fraud: Synthetic identity fraud are likely to be unreal and assumed identities which are easy to generate but applying them is difficult.

2. Real identity fraud: Real identity fraud is the illegal use of identity details of innocent people, which is not easy to obtain but applying them is easy.

Identity crime in actuality is a both synthetic and real identity fraud and is popular because of real data. Due to the availability of real identity data like web and insecure data, hiding original identity is essential and become easy.

For analysis of data, the technique called data mining is used for summarization of essential information. With rapid increase in technologies of E-commerce, necessity of credit card is increased. Credit card payment is the most stylish approach of recent years, which is done online and also with regular purchase. These are some of the reasons which raised credit card frauds.

2. RELATED WORK

Many of the researchers detected fraud in credit card so development is necessary. Research contribute in applying credit card or when transaction should proceed.

V.Mareeswari et al. In[1] proposed about credit card fraud detection, the system proposed by author predicts the general fraud and suspected activities. Author used (HSVM) hybrid support vector machine for the identification of fraud, it calculates the attribute weight and detects spike for applications of fraud detection in credit card.

Clifton Phua et al. In[2] detected about fraudulent application using the combination of methods called communal and spike detection. Communal detection is applied for communal data, it identifies errors in data and legal behavior of applicant. On real time communal detection algorithm works between similar categories of data with scores.

K.RamaKalyan et al. In[3] Proposed about the combination of Genetic algorithm and Decision making algorithm for the better performance of credit card fraud detection. Experiment is performed by creating test data with detecting fraudulent activities. Algorithm used is based on genetic algorithm and is called as optimization technique.

Abhinav Srivastava et al. In[4] Defined about fraudulent transaction, where transaction does not accept message prints using HMM model. An application is proposed by author using HMM to detect credit card fraud. Different types of transactions are processed in credit cards which represents some random steps of HMM. Author with the help of transaction list observes different types of items in the state of HMM.

Joseph King-Fung Pun et al. In[5] Distinguish between real and fraud data using decision plan making. The essential issue faced in credit card fraud detection is that the most of the general percentage of transactions which are labeled as fraudulent are authorized. These creates conditions of false alarm which results in delay of false transactions.

3. PROBLEM DOMAIN

3.1 Problem Overview:

Online credit card transaction is a framework which is web based and utilize the information of user to process further. Information mining is used for the calculation of user identity.

Depending on the calculation made the existing system works which is the combination of communal and spike detection method. There combination recognizes about users identity whether he/she is valid or fraud. But faces the limitations.

3.2 Detailed Problem Statement:

Issue of credit card is growing day by day with the enhancement in its use. A research says that in US, credit card loss has been exceeded to over \$850 million with the representation of increase in 10% of fraud over the year 1991. Whenever compared losses of credit card over the years it has been found that credit card fraud is increasing day by day. Total volume of charge represent for fraud is calculated in percentage, with the faster growth in credit card business. It has been found that from the year 1988 to 1991, issue of fraud has increased from from 8 points to over 20 points.

Credit card frauds can be of many form and is categorized in various principal. Frauds are generally because of lost or stolen cards, it is of base level. Base level size can be affected generally with conditions like economic.

4. SOLUTION DOMAIN

A Hidden Markov Model Classifier has been considered for fraud detection and transaction classification. Study of previous work explore that Hidden Markov model is unable to diagnose fraud symptoms on training dataset. To overcome this issue a advanced technique has been integrated with existing classier model to improve the performance of existing solution. To do this a credit card fraud detection dataset will be used in the proposed work for the detection of fraud based on credit card. It will be the transaction framework which utilize the users information. Issue arises using credit card is analyzed above in problem domain.

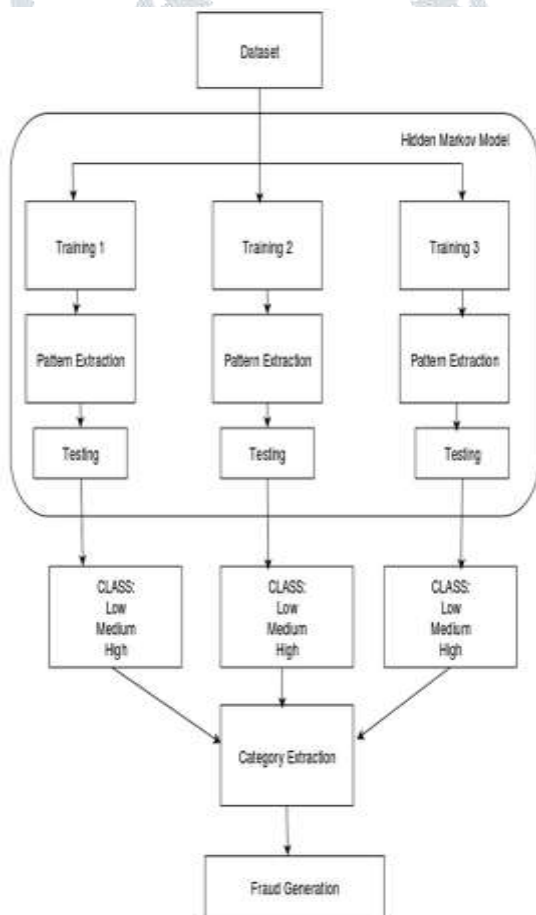


Figure 1. System Architecture

Solution describes that the dataset is taken which will analyzed using Hidden Markov Method and Custom algorithm forming Advance Hidden Markov Model. Dataset consisting of some training data and testing data, Hidden Markov takes the initial transactions and according to it

forms the pattern for the entire dataset. Initial transaction based on user at the time of execution will take some input and then test complete dataset based on the pattern form. On this basis, data is classified into three class namely low, medium and high.

At last the result will be concluded for the three class, concluding that if one data appearing in low class can be in low for the other set of data or can be in high class. Union is calculated among them, for the appearing transaction in the class should be same.

This is the customized algorithm used along with Hidden Markov Model for the implementation of Advance Hidden Markov Model for credit card fraud detection.

5. RESULT ANALYSIS

Result analysis part describes result of complete work and is evaluated in form of table and graph. Result describes the proposed work for training set with computation time.

For every training set some time is required to complete task and similar approach is with existing work.

Comparison of both the existing and proposed work is also evaluated.

Table 1: Existing work

Time (Seconds)	Training Length
2	1000
4	2000
5	3000
6	4000
8	5000

Table 2: Proposed work

Time (Seconds)	Training Length
414	1000
420	2000
519	3000
524	4000
968	5000

training length 1000

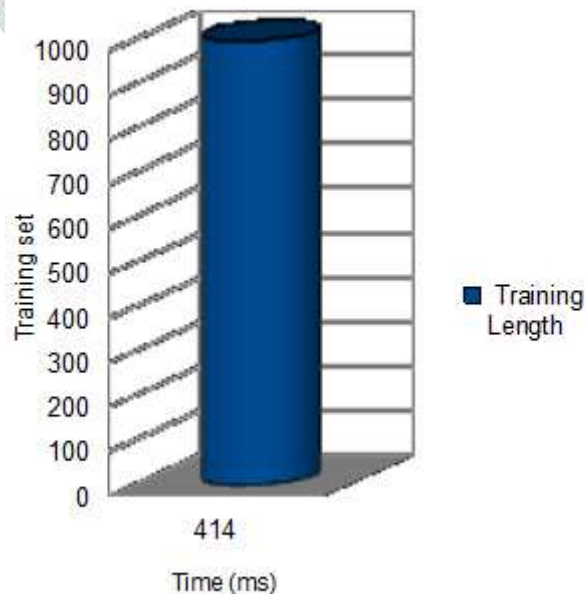


Figure 2: Graph for training length 1000 (Proposed Work)

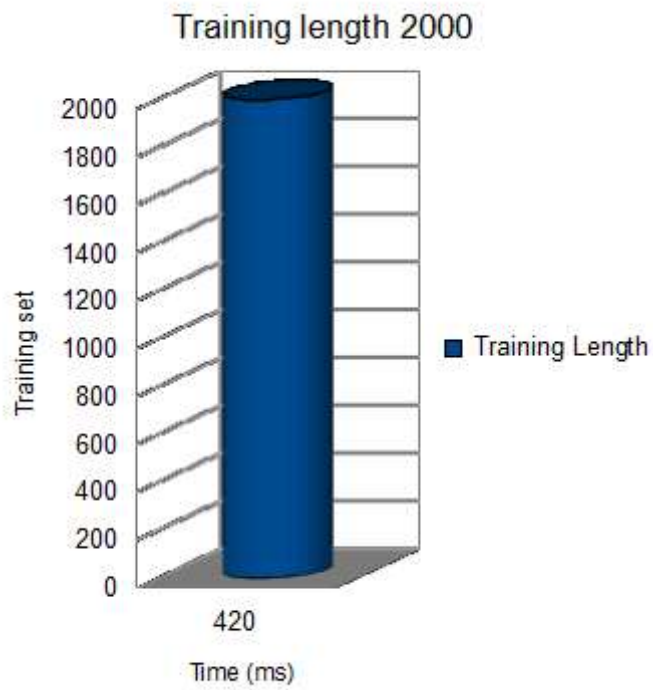


Figure 3: Graph for training length 2000 (Proposed Work)

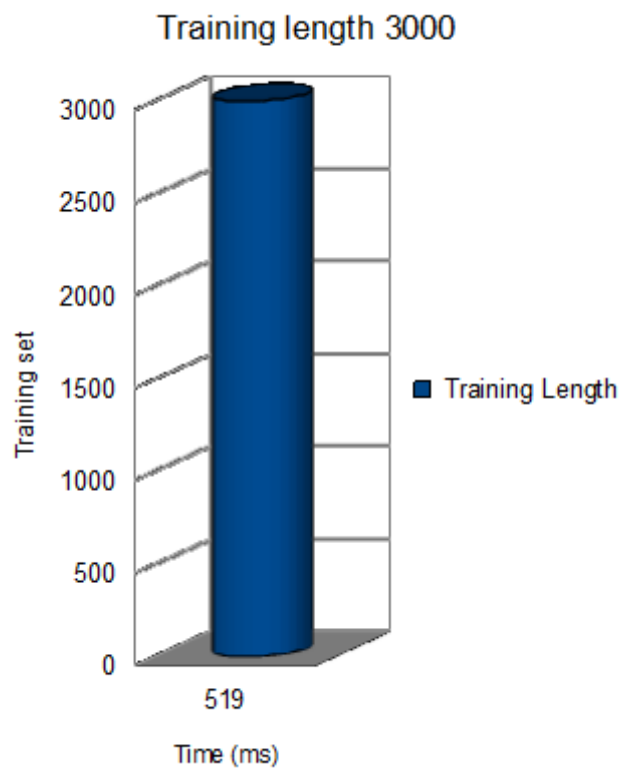


Figure 4: Graph for training length 3000 (Proposed Work)

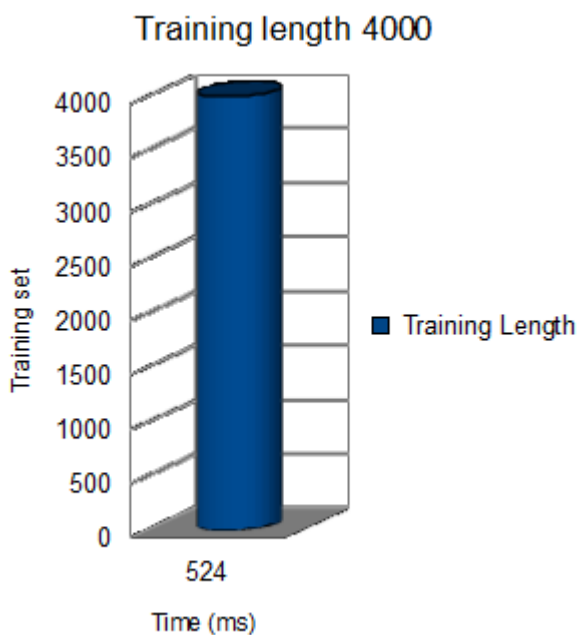


Figure 5: Graph for training length 4000 (Proposed Work)

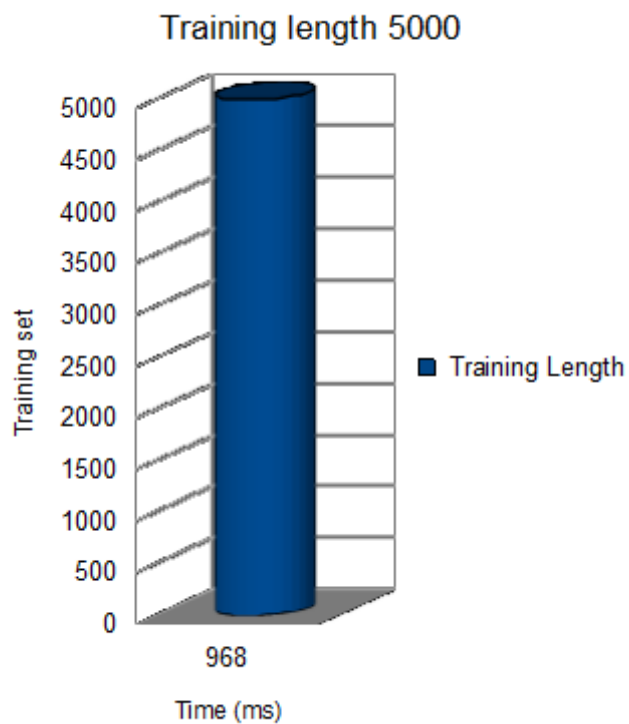
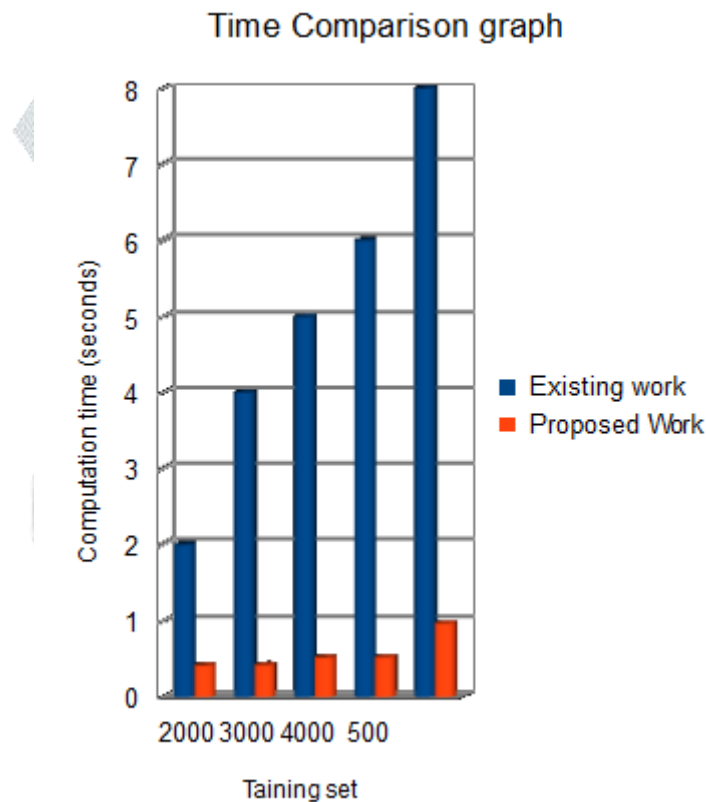


Figure 6: Graph for training length 5000 (Proposed Work)

Table 5.3 Comparison Table

Training set	Existing work (seconds)	Proposed work (ms converted into seconds)
1000	2	.414
2000	4	.420
3000	5	.519
4000	6	.524
5000	8	.968

Figure 7: Time Comparison Graph



6. CONCLUSION

Study mainly focuses on identifying fraud cases. On the basis of performance of model, frauds are identified. Fraud detection systems are improved using beneficial combination methods. It also deals with different models and can be extended in different fields. On the basis of Hidden Markov Model a transactions are decided as they are fraudulent or not. This type of system reduces rate of fraudulent activity with comparing previous transactions that were certain. Here, predictions made for fraud are reduced with enhancing techniques and the behavior of card holder.

Security is the major concern which affects customer, merchant and bank. Due to digital transaction medium it is vulnerable for several security threats. To protect such digital transaction and detect occurred fraud this work has developed a modified hidden Markov model based fraud detection technique to extract suspected transactions. The aim of this paper is to explore survey of recent work and proposed solution to overcome issue of hidden Markov model.

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