A Research on Hidden Markov Model and K-means Bank based on Bank Anti -Fraud Detection Model

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Abstract:- Money transfer on internet is happening very fast. Money applications for payment of salary have been made on the internet. Due to which cases of fraud are also increasing. İn this paper, we have made a little effort to remove this fraud from the hidden markov model. Here, we have used K-means algorithm. The K-means algorithm has been used for symbolic and frequency transactions. Starting is normal behavior with HMM account. Any transaction is considered fraudulent if the transaction does not go through the HMM process. Here is an example of real world bank, in which the experiment has been validated by simulation and the model used. İf we look at the old data, then this model works well at low medium frequency.

Keywords:- Fraud, Fraud Detection, K-Means, Hidden Markov Model.

I. INTRODUCTION

Keeping up with the daily activities of people, fast resources on the internet have been used. It has been told about how people connect and transact on the internet. People are in a hurry of transaction due to which the chances of getting fraud are increased. Because of which it becomes difficult for the bank and consumer to find fraud. In such a situation, the anti- fraud model is used. Finding and removing fraud is a big demand for this model[1]. Here we have added HMM and K-means algorithm to solve such problem.

II. HMM AND K-MEANS ALGORITHM IN ANTI FRAUD MODEL

1.1. Use of Hidden Markov Model

HMM has been told to describe the Markov chain which describe the Markov process. Markov model is based on the unknown parameter. This is a process in which on process is visible and the other is not visible.

Here is some technology for credit card fraud detection, in this research the hidden markov model has been described in the techniques of data mining. Fraud is a complex stochastic process , which is compared with the traditional hidden markov model. There are finite set of stage, in which outcome are obtained according to the probability process. This model works according to human behavior, when the fraudster's behavior falls away from a normal human ,an alarm is sounded.

In this research , the techniques of the hidden markov model for credit card fraud detection have also been told. At The fraud detection system which banks issue a credit card to the customer is taken into it. Whatever transmission occurs, transmission is verified by the FDS. FDS takes all the details of the card, And checks whether the transmission is Genuine or not. If the transaction is correct then it is completed otherwise the card holder is informed about this fraudulent transaction. Hmm is maintained for every card holder. Symbols are made according to every transaction of the card holder. The clustering algorithm is applied on past transactions of card holder. All the transaction are stored in the bank's database, which keep a lot of attributes.

$B=(a,b,\&)$:

this is describe by Hidden Markov model.

$K= (k1,k2,………kN)$;

In hidden markov model some possible states corresponding to above transaction.

$V=(v1,v2…vM)$; These are all observation state.
N total number of state. M is distinct observation .

### 2.2 Dynamically Generate Symbols Using K-means:

All the observations in k- Means clustering are divided into k-parts, which are related to all clustering. Here, d-dimensional, k-means clustering and n observation.

S sets=$\{s1,s2,s3,……sK\}$; Then the main objective is:
In this analysis, k-means algorithm we can partition the input into k clusters.

III. ANTI-FRAUD MODEL

According to this paper, anti fraud means designing real parameter according to the user's profile. In this model, the user's historical data is generated. In this model, the user's historical data is generated. On the basis of which the frequency sequence is carried out. By which k-means clustering and its symbol is made. After which the data is generated from a training set. Perfect parameter is generated from HMM model.
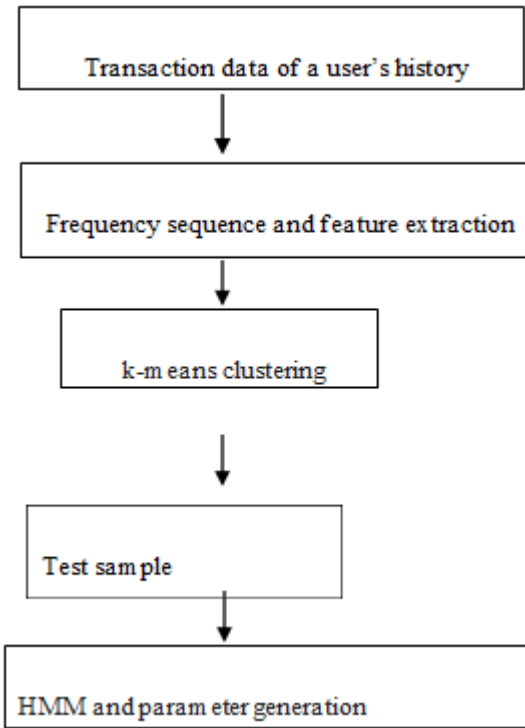
Flow chart

3.1 Parameter Estimation and Training

The running of any HMM algorithm can be described as a function f (x). This is the next step of symbolization.

Here , set of observation symbol O O={O1,O2,O3,   ON}

According to this given observation the parameter of Hidden Markov Model are B=(a,b,&); Here normally we are using Baum-Welch algorithm to set the parameter.

3.2 Fraud Detection:

if we talk about the HMM model, then we have taken some parameters to test it.

$= (A,B,@). This is true method for fraud detection. In this observation, we have observed the T time along with the R length, o1,o2,o3,…… oN. Which we have used as input of HMM. For which the forward- backward algorithm is taken here. Which has been denoted A.

A1= P(o1, o2,...oN| $)

If we talk about the next observation state with T+1 time.

A2= P(o2,o3…...............oN+1|$)

IV. EXPERIMENTS AND RESULTS

In this research, two parameter are given one is TP that means actual parameter and FP that means higher possible parameter.

4.1 Simulation Experiment and Result Analysis

Group	Amount sequence			Amount and frequency sequence								
	l	m	h	ll	ml	hl	lm	mm	hm	lh	mh	hh
TP	.59	.57	.40	.86	.77	.65	.70	.68	.62	.64	.62	.60
FP	.06	.08	.15	.7	.3	.1	.5	.4	.4	.7	.4	.2

Fig: Simulation Result
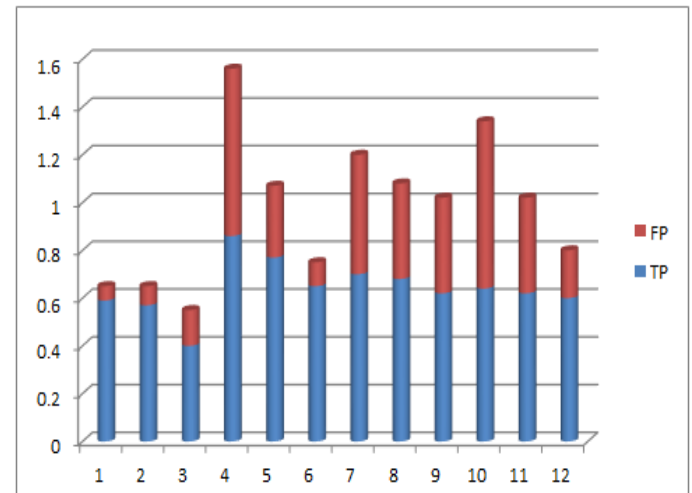
Simulation graph

4.2 Real Bank Data Verification Experiment and Results:

It is used where fraud is more. All the transactions that have been checked here are some of the fraud transaction. All the old transaction frauds have been investigated with the help of HMM algorithm.

threshold	TP	FPl	PRECISION	RECALL
.8	18	152	0.16	.30
.6	25	308	0.09	0.39
.4	23	533	0.06	0.39
.2	24	198	.02	0.39

Fig: Experimental result

V. CONCLUSION

Both K-means algorithm and HMM are based on fraudulent transactions in the bank. In this paper, it has been explained how the use of these two models can prevent bank fraud. Therefore, it is called the bank anti-fraud model. This method is capable of eliminating fraud using simulation experiments and real bank data. Apart from this, focus has also been laid on the parameters of HMM model in future work. HMM has been given a special place in the field of fraud detection such as electric field and development of Information of Technology.

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