RECOGNISE THE ANALYTICAL PATTERN OF ATM USAGE AND IT'S FINANCIAL PROBABILITY

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Abstract:

Data mining is becoming strategically important area for many business organizations including banking sector. It is a process of analysing the data from various perspectives and summarizing it into valuable information. Data mining assists the banks to look for hidden pattern in a group and discover unknown relationship in the data. Today, customers have so many opinions with regard to where they can choose to do their business. Early data analysis techniques were oriented toward extracting quantitative and statistical data characteristics. These techniques facilitate useful data interpretations for the banking sector to avoid customer attrition. Data mining techniques has been proved the most commonly used techniques for prevention and detection of financial frauds. The implementation of data mining techniques for fraud detection follows the traditional information flow of data mining, which begins with feature selection followed by representation, data collection and management, pre - processing, data mining, post-processing, and performance evaluation

Key words*: Data mining techniques, Financial Probability*

1.0 INTRODUCTION

Technological innovations have enabled the banking industry to open up efficient delivery channels. IT has helped the banking industry to deal with the challenges the new economy poses. Now adays, Banks have realized that customer relationships are a very important factor for their success. Customer relationship management (CRM) is a strategy that can help them to build long-lasting relationships with their customers and increase their revenues and profits. CRM is of greater importance in the banking sector. The CRM focus is shifting from customer acquisition to customer retention are ensuring the appropriate amounts of time, money and managerial resources. The challenge the bank face is how to retain the most profitable customers at the lowest cost. At the same time, they need to find and implement this solution quickly and the solution to be flexible. To detect fraud, they require complex and time-consuming investigations that deal with different domains of knowledge like financial, economics, business practices and law. Fraud instances can be similar in content and appearance but usually are not identical. In developing countries like India, Bankers face more problems with the fraudsters. Using data mining technique, it is simple to build a successful predictive model and visualize the report into meaningful information to the user.

Application Areas of Data Mining Techniques

IN BANKING Security and fraud detection: Big secondary data like transaction records are monitored and analysed to enhance banking security and distinguish the unusual behaviour and patterns indicating fraud , phishing, or money laundering (among others).

Risk management and investment banking: Analysis of in-house credit card data freely accessible for banks enables credit scoring and credit granting which form part of the most popular tools for risk management and investment evaluation.

CRM: DM techniques have been widely applied in banking for marketing and customer relationship management related purposes such as customer profiling, customer segmentation, and cross/up selling. These help the banking sector to have a better understanding of their customers, predict customer behaviour, accurately target potential customers and further improve customer satisfaction with a strategic service design.

Other advanced supports: A few mainstream applications focus on branching strategy, and efficiency and performance evaluation, which can significantly assist in achieving strategic branch locating and expansion plans.

2.0 LITERATURE REVIEW

Abdulrahman et al [1] The banking sector has taken advantage of the rapid growth and development of ICT in Nigeria, and Sokoto State in particular, which it has utilized in providing innovative technologies to enhance operational efficiency and quality of services in order to retain old customers and attract new ones. The rapid growth in the use of ATMs in Sokoto State of Nigeria offers opportunities to banks to use customers' passion for this innovative service for strategic advantage.

Ajay Manjhi et al [2] The analysis part shows that self-service technology play important role in their life. ATM is most preferred services in compare to internet banking and mobile banking. But internet banking has great importance; it covers all banking transaction efficiently. Mobile banking has low usage in comparison to others two SSTs.

Areeba Toor, et al [3] the statistical analysis, it has been observed that customers are fairly satisfied with the e-banking services in Pakistan in terms of service quality. Major finding of the study includes there is relationship of each independent variable with the dependent variable when studied individually.

Aijaz Ahmed Shaikh [4] The ATM transactions in Pakistan have recorded a continuous growth over the period of time, which shows the customer preferences in selecting and using this E-Banking Channels for conducting both financial and non-financial transactions. The ATM Fraud at the same time has opened up new chapters in the IT security portfolio demanding a reasonable attention from the higher management in thwarting ATM fraud at its early stages.

Chinedu N. Ogbuji [5] ATMs have contributed to the alarming rate of fraud in the Nigerian banking industry but the proportion of bank fraud attributable to ATM was not ascertained. ATM fraud can only be reduced but can no longer be absolutely stamped out from the Nigerian banking system. ATM as an electronic means of delivering banking services makes people live riotous life at spending.

V.SUREKHA [6] In the modern marketing customer satisfactions is of paramount importance. The study on service quality in selected banks is measured in five dimensions by using SERVQUAL scale developed by Parasuraman et al (1988). The number of responses in the present research reveals that there exists a small perceptual difference regarding overall service quality with the respective banks.

A.Vennila et al [7] Banks must make concentrated efforts to educate female customers to use ATMs. For this purpose banks must hold training programmes for customers from time to time. Younger customers of the bank use these services more than the older generation. Banks must make efforts to educate them as well in the use of ATMs.

D. Jagadeesan et al [8] The concept of measuring the difference between expectations and perceptions in the form of the SERVQUAL gap score proved very useful for assessing levels of service quality. This study argues that, with minor modification, SERVQUAL can be adapted to banking organization. Information on service quality gaps can help managers to diagnose where performance improvement can best be targeted.

Deepti Kanojia, D.R. Yadav [9] In the emerging competitive environment and IT era, with little or no distinction in the product offerings, it is the speed of rendering service that sets apart one bank from another. Prompt service is equated with quality service. Time is a major factor which affects the quality and Reputation of the bank. E-banks are providing quick service and that is why they are becoming more popular.

Jegede C.A [10] The paper reveals that Automated Teller Machine is important and very effective, and its discussion is not whether it is desirable or not, but to determine how the emerging technologies can be better annexed and channelled to promote banking sector growth, more productivity, more trade, improve banking records keeping, greater modernization and better living standard among Nigerians.

3.0 methodology

Data mining is a process to extract knowledge from existing data. It is used as a tool in banking and finance in general to discover useful information from the operational and historical data to enable better decision-making. It is an interdisciplinary field, confluence of Statistics, Database technology, Information science, Machine learning and Visualization. It involves steps that include data selection, data integration, data transformation, data mining, pattern evaluation, knowledge presentation. Techniques applied for mining knowledge can be divided into various classes depending on the nature of knowledge that system is unearthing. We will now look into these important techniques The credit card fraud detection system developed used four clusters of low, high, risky and high risk as shown in Fig.1. Once the transaction is legitimate, it was processed but if any transaction falls into any of these clusters; it was labeled as suspicious/fraudulent. The alert goes off and the reason is given. The fraudulent transaction will not be processed but will be committed to the database.
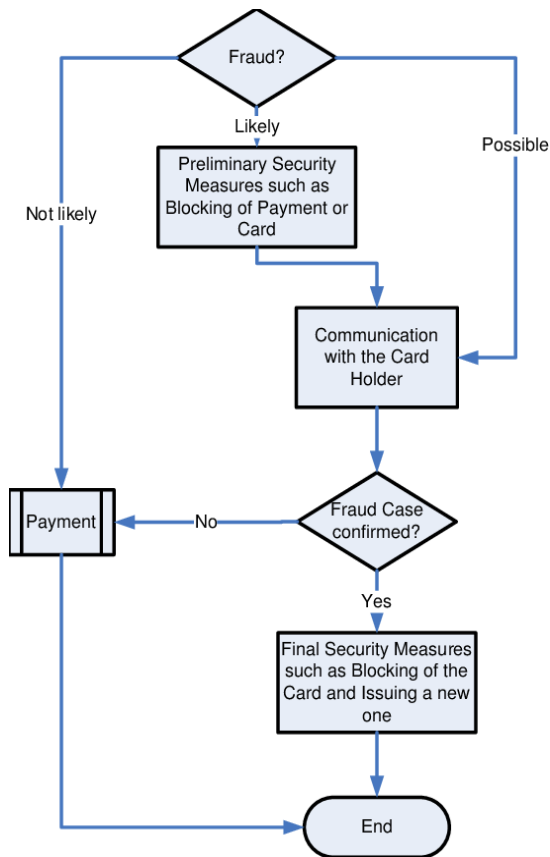
Figure: A Four-Stage Credit Card Fraud Detection Model

Correlation Analysis of Financial Indicators

By using the traditional analysis variable correlation coefficient measurement method, we select some financial indicators of sample firms for correlation analysis, and eliminate some highly correlated financial indicators. The correlation coefficient can be expressed as follows:

$$r_{x,y} = \frac{n\sum x_i y_i - \sum x_i \sum y_i}{\sqrt{n\sum x_i^2 - (\sum x_i)2}\sqrt{n\sum x_i^2 - (\sum y_i)^2}} \quad\quad ((1))$$

In the formula, x and y represent two variables. rx,y represents the correlation coefficient of the two variables, and - 1 B rx,y B 1. When |rx,y| = 1, it indicates that x and y are completely linear. When rx,y = 1, it represents a complete positive correlation between x and y. When rx,y = - 1, it represents a complete negative correlation between x and y. When rx,y = 0, it indicates that x is not related to y. In most cases, when - 1\r[1. There is a certain linear relationship between x and x

Hypothesis testing & findings

The researcher has tried to present the data in a tabular, measurable, and classified fashion. It is evident from Table that respondents are aware of and favour using ATM services offered by their banks.

Table – 1 depicts the gender wise distribution of respondents.

Gender	Frequency	Percentage
Male	232	77.34
Female	68	22.66
Total	300	100

Source: Based on primary data

There are 68 (22.66%) female respondents while 232 (77.34%) are male respondents. In The survey total 300 respondents are considered for the sample size. The frequency of the male for ATM usage is higher than female which indicates the usage of the ATM functionality taken by the male in the Mumbai.

Classification and Prediction:

This is the most commonly applied data mining technique. It is employed when the classes of data in the population are known. For example, in the case of detecting fraudulent banking transactions from a bank's transactions database, there can only be two classes, namely fraudulent and non-fraudulent. It constructs a model from the sample data items with known class labels and use this model to predict the class of objects in the population whose classes are not known. Each tuple from the database contains one or more predicting attributes which determines the

predicted class label of the tuple according to the constructed model. In the banking scene, classification technique is employed for Fraud detection (both corporate and credit fraud) These models are constructed usually using a decision tree model or a neural network model.

Cluster Analysis: Formation Clustering is similar to classification. But subtle difference is that classes are not known before. Clustering is used to generate class labels. The objects are classified or grouped based on the principle of maximizing the similarity within a class based on the observed pattern. A regularly used and the simplest of clustering algorithms is K-means algorithm Heuristics based on the domain information can be applied to cluster data where K-Means algorithm produces a large number of outliers. Self-Organizing Map is an important neural network-based technique employed for clustering and has been applied.

4.0 RESULTS AND DISCUSSIONS

Banks lose millions of dollars annually to various frauds. Detecting fraudulent transactions can help the banks to act early and limit the damages. Fraud detection is the process of identifying fraudulent transactions from genuine transactions or in other words this process segregates a list of transactions into two classes namely fraudulent and legitimate Most important area where fraud detection can help is the credit card products. Clustering methods can be used to classify transactions and outliers can be analyzed for frauds Probability density of credit card user's past behavior can be modeled and the probability of current behavior can be calculated to detect frauds Patterns of customer's transactions can be discovered and alerts can be generated if any

measurable deviations are found. Financial statement fraud detection is another area that can employ data mining principles to effective use. Banks make credit decisions based on financial statements produced by customers. These statements may contain overstated assets, sales and profits or it may understate losses and liabilities. Even though these statements may have been audited, these kinds of frauds are hard to detect using normal auditing procedures. Classification techniques based on neural network, regression and decision tree are used for classifying fraudulent ratios in the statements from the nonfraudulent data

Classification Analysis:

We consider four metrics in order to evaluate the results of the classification: Precision, Recall, FMeasure and Accuracy. The precision has been computed as the proportion of the examples that truly belong to class X among all those which were assigned to the class. It is the ratio of the number of relevant records retrieved to the total number of irrelevant and relevant records retrieved:

Table: Classification Results

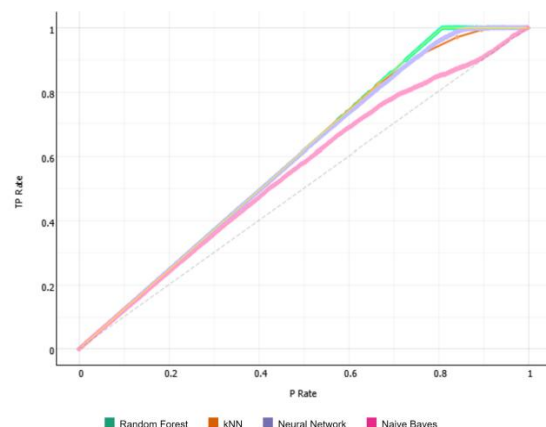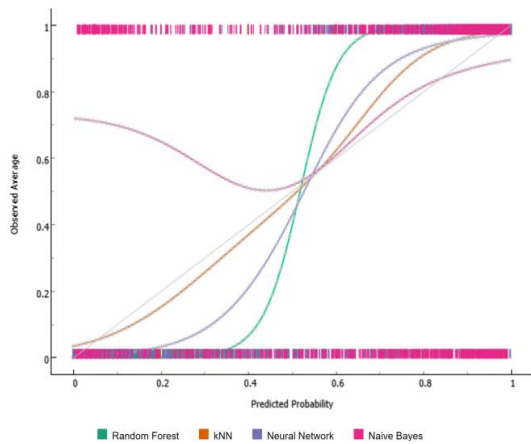| Algorithm	Precision	Recall	F-measure	Accuracy
Random Forest	0.998	0.998	0.998	0.998
kNN	0.916	0.919	0.916	0.919
Neural Network	0.945	0.943	0.945	0.943
Naive Bayes	0.749	0.760	0.754	0.760

Figure: Lift curve.
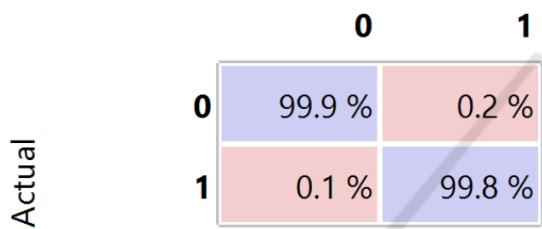

Figure: Calibration plot

Figure: confusion matrix

The confusion matrix in Figure shows percentage of instances correctly classified (in the purple boxes) and the percentage of instances misclassified (in the pink boxes): for the defaulted loan applicants class (i.e. 0) we obtain the 99.9% of instances correctly detected (while the remaining 0.1% is erroneously classified as belonging to the 1 class), while for the paid loan applicants class (i.e., 1), the proposed method reaches a percentage equal to 99.8% of instances correctly detected with the 0.2% of instances misclassified.

Conclusion:

Data mining based on machine learning techniques is a technology that can be used to analyze existing data, applications and customer needs in order to build and maintain long-term customer relationships. It can build confidence for clients making customer satisfaction and business the longest We evaluate four different supervised machine learning algorithms and we empirically demonstrate that the model which obtains best predictive performances is the one built using the Random Forest algorithm. Our investigation suggests that the banking context, and in particular the CRM area, can benefit from the extraction of knowledge from the proposed data mining techniques, by supporting more effective and efficient credit risk assessment approaches. In fact, as shown by the results, these techniques can provide more accurate information to the loan decision-making process, with significant improvements not only in risk analysis but also in potential cost savings and in the time of evaluation of loan applications. It involves steps that include data selection, data integration, data transformation, data mining, pattern evaluation, knowledge presentation. Banks use data mining in various application areas like marketing, fraud detection, risk management, money laundering detection and investment banking. The patterns detected help the bank to forecast future events that can help in its decision-making processes. More and more banks are investing in data mining technologies to be more competitive.

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