Data Mining as a tool for Empowering Business Organizations

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Abstract

In the present era of globalization and cut throat competition, the organizations have realized that their biggest asset is the information and hence the knowledge derived from it. The organizations having right access to the right information at the right moment of time will be the one to survive. With the advent, usage and growth of IT and IT enabled services, the organizations have become data rich and information poor! Its is rightly said in the business world that if you are not able to act before your competitors, that means you are dead. In such a scenario, the use of data mining and its techniques are really a boon for the decision makers. The present paper tries to explore the potential benefits of data mining and how these techniques can be used for marketing, customer relationship management, risk management, fraud detection, and prediction of purchasing patterns and churn behavior of the customers.
Keywords*: Globalization, Churn behavior, CRM, Knowledge Discovery.*

Introduction

The choices we make in our life have life changing and everlasting consequences. Trival decisions can have big effects on our present and also on the future. So, its always said that *the key to success is to make good choices!* Every day a number of decisions must be made that determine the direction and efficiency of the organizations and the individuals. Organizations make decisions regarding production, marketing and personnel; decisions are made regarding costs, sales and margins. So, in order to compete in the present day environment of globalization and cut throat competition, where organizations have limited resources, the importance of effective decision making increases many fold. The overall impact of effective decision is not based only on the caliber of the decision maker, but it also depends on the person/team responsible for the implementation. There are numerous examples in the history where brilliant strategic plans went in to doldrums because of poor decisions made by those who are responsible for the implementation. So, effective decision making is an essential throughout the organization. The irony of present day environment is that *we are becoming data rich and information poor*. The success mantra is *all about getting right information, to right decision makers at the right time in right format.* The huge size of these data bases makes it impossible for the organizations to analyze these data bases and to retrieve useful information as per the need of the decision makers [5]. Designing the new MIS or restructuring the existing ones would not be possible by just replacing the existing computerization packages. The solution seems to be in incorporating the concept of data warehousing and data mining. Due to the vast expansion of the horizons of the data and its multivariate uses, the organizations and the individuals are feeling a need for some centralized data management and retrieval system. The centralization of the data is required basically for better processing and in turn facilitating the user access and analysis.

Data Mining is the process of extracting knowledge hidden from large volumes of raw data. The knowledge must be new, not obvious, and one must be able to use it.
Data mining has been defined as "the nontrivial extraction of implicit, previously unknown, and potentially useful information from data [1].

It is "the science of extracting useful information from large databases" [2].

Data mining is one of the tasks in the process of knowledge discovery from the database [10]. The steps involved in Knowledge discovery are [7, 10]:

1. Data Selection The data relevant to the analysis is decided and retrieved from the various data locations.

2. Data Preprocessing: In this stage the process of data cleaning and data integration is done.

- Data Cleaning: It is also known as data cleansing; in this phase noise data and irrelevant data are removed from the collected data.

- Data Integration: In this stage, multiple data sources, often heterogeneous, are combined in a common source.

3. Data Transformation: In this phase the selected data is transformed into forms appropriate for the mining procedure.

4. Data Mining: It is the crucial step in which clever techniques are applied to extract potentially useful patterns. The decision is made about the data mining technique to be used.

5. Interpretation and Evaluation: In this step, interesting patterns representing knowledge are identified based on given measures.

The discovered knowledge is visually presented to the user. This essential step uses visualization techniques to help users understand.

Review of Literature

According to the regulations given by Reserve Bank of India, the banks have to Provide Off-site Monitoring Surveillance (OSMOS) reports on regular basis in electronic format only and Regulatory requirement of filing of statutory returns such as the one under Section 42 of the Reserve Bank of India Act, 1934 for working out Cash Reserve Ratio (CRR) and Statutory Liquidity Ratio (SLR) obligations in electronic format [2].

According to the Committee formed by Reserve Bank of India Headed by Dr. A. Vasudevan to go through the details of this topic, gave his report on 17th July,1999, the committee highlighted that by the use of data mining techniques, data available at various computer systems can be accessed and by a combination of techniques like classification, clustering, segmentation, association rules, sequencing, decision tree various ALM reports such as Statement of Structural Liquidity, Statement of Interest Rate Sensitivity etc. or accounting reports like Balance Sheet and Profit & Loss Account can be generated instantaneously for any desired period/ date [2].

Madan Lal Bhasin (2006)[3] opined that the leading banks are using data mining tools for customer segmentation and profitability, credit scoring and approval, predicting payment default, marketing, detecting fraudulent transactions, etc. Chase Manhattan Bank in New York, was facing a financial crunch mainly due to constant decrease in the customer base, then the bank used the techniques of data mining to analyze customer profiles and to use them for their benefits and hence chalked out the strategy for the survival and succeed in its attempt. Data mining is also being used by Fleet Bank, Boston, to identify the best candidates for mutual fund offerings.

M Purna Chander[4] emphasized that acquiring new customers is more costlier process than retaining existing customers. They emphasized on modeling churn behavior of bank customers in Indian scenario. Many characteristics of customers like demographic details, psychographic, product purchase details, customer perception details are vital in modeling the churn behavior of bank customers. In Indian banking system, the banks have not arranged their data earlier as per the requirements for prediction of their churn behavior, so they highlighted the method for converting

raw customer data into meaningful data that suits modeling churn behavior. Then, this meaningful data can be converted into knowledge; predictive data mining techniques are used.

Rob Gerritsen(1999)[8] opines that the performance of the company will improve many folds if they could predict the response of the customers for a particular promotion scheme or if the company could predict that whether the customers will be able to repay the loans or not. The basic data mining techniques and models were applied in a project for the US Department of Agriculture. Basic data mining techniques helped the official of rural housing service to understand and classify the loyal and disloyal customers.

Leena Baliga(2000)[9] in her article in Indian Express Newspapers highlights that Citibank, HDFC Bank and ICICI Bank have taken the lead in using data mining along with leading mobile telephony service providers.

Major Data Requirements of the Industry:

1. What is the profile, tastes, preferences and purchasing behavior of the customer?
2. What is the transaction behaviour of various customers?
3. Which products are often purchased together by the customers of which particular profile?
4. What services and benefits would current customers likely desire?
5. Identifying the customers who are getting all types of services from your company?

Major Goals the organization needs to achieve:

1. Cross selling the products.
2. Differentiating Loyal and Disloyal Customers.
3. Target Marketing to focus on prospective customers.
4. Prevention of defaults, bad loans.
5. To increase customer retention.

A. Marketing

Knowing your customer is the buzzword today in the industry. If you are unable to cater to the needs of the customer before your competitors that means you are dead. Reaching out to the right customer at the right time with a right offer is the rule for the survival. The basic concept of marketing which was the production of goods as per the requirements of the customers and then to sell the products to them through various channels, has been changed to touching the hearts of the customers and to create a sense of belongingness, so that they should remain the loyal customers to the organization. So the concept of CRM is evolving at a great pace. As we are already aware of cut throat competition prevailing in the market in almost all areas, and banking sector is not an exception to it. The marketing and customer care goes hand in hand. Know Your Customer (KYC) is the buzzword these days.
Financial institutions are finding it more difficult to locate new previously unsolicited buyers, and as a result they are implementing aggressive marketing program to acquire new customer from their competitors. Moreover the uncertain behavior of the customer is making this task more tedious. An interesting tool available in marketing and financial institution is analysis of client's data. This allows analysis and calculation of key indicators that help bank to identify factors that affected customer's demand in the past and customer need in the future [6,8]. Data mining techniques will help in making customer oriented strategies for their customers in various categories. The data mining techniques can be used to determine that how customers will react to adjustments in interest rates, which customers will be likely to accept new product offers, the risk profile of a customer segment for defaulting on loans etc. [4,9]. The reaction of the customer for the existing and new products can be recorded, according to which the future strategies can be designed. They can also use the data mining

techniques for cross selling. Data mining can improve the response rates in the direct mail campaigns as the time required to classify the customers will be reduced, this in turn will increase the revenues, improve the sales force efficiency from the target group [5].

B. Customer Relationship Management: Data mining can be useful in all the three phases of a customer relationship cycle: Customer Acquisition, Increasing value of the customer and Customer retention. Data mining technique can be used to create customer profiling to group the like minded customers in to one group and hence they can be dealt accordingly. The information collected can be used for different purposes like making new marketing initiatives, market segmentation, risk analysis and revising company policies according to the need of the customers. The profiling is usually done on the basis of demographic characteristics, life style and previous transactional behavior of a particular customer.

Expanding the Customer Base by acquiring new and profitable customers To expand the customer base, Data mining can answer questions like:
Which new market the organization can intrude into?
Which kind of customers would you like to acquire?
Which kind of customers will drive your growth in future?
Which new customers are likely to be interested in your products?**.**

Lengthening the relationship with your top customers: To lengthen the customer relationships, Data mining can answer these questions:
Which customers in particular do you want to keep?
Which customers will drive most of your profits?
Which customers might switch to your competitors and why?
Which customers are dissatisfied with your services and products?

Increasing Customer Delight through customized services: Intensifying and deepening customer relationships is also the need of the hour for the organizations. The concept of customer satisfaction has been shifted to customer delight, which can be enhanced by providing more customized services. The company needs to explore;
Which customers are likely to give you more business?
Which products and services interest a particular customer?
Which products are typically bought together and by which set of customers?
What cross selling opportunities should you consider?

C. Risk Management: The customer and the organizations while dealing with each other will always try to cover the risk factor. To identify, quantify and control the risk factor is always an area of concern for every business organization. In commercial lending, risk assessment is usually an attempt to quantify the risk of loss to the lender while making a particular lending decision. Data mining techniques help to distinguish borrowers who repay loans promptly from those who don't [8]. It also helps to predict when the borrower is at fault, whether providing loan to a particular customer will result in bad loans etc. Such techniques come under the category of credit risk, where we wish to check the behavior of the prospective customers [10]. Bank executives by using Data mining technique can also analyze the behavior and reliability of the customers while selling credit cards too.

D. Fraud Detection: While dealing with banks, the customers and the banks have the chances of falling an easy prey to the frauds. So both the parties wish to be secure while dealing with each other. The data mining techniques can help them to detect and hence prevent frauds. The data mining techniques will help the organization to focus on the activities and transcational behoviour of the customer which is leading towards doubtful behavior and unexpected activity. For fraud detection, the

data mining technique, outlier analysis may also be used, where any unexpected transaction is considered as an outlier, once detected should be taken care of accordingly.

E. Churn Analysis: In the dynamic market scenarios where companies are coming up with varied options every now and then, customer retention is a critical area to ponder upon, as customers usually churn from one company to another quite often and this too is happening at an alarming rate and is becoming the most important issue in customer relationship management. So prediction of the customer behaviour and hence taking remedial actions before hand is the need of the hour. But the ever growing data bases make it difficult to analyze the data and to forecast the future trends. The solution lies in the use of Data Mining tools for predicting the churn behavior of the customers.

Conclusion

Data Mining techniques can be of immense help to the organization in solving business problems by finding patterns, associations and correlations which are hidden in the business information stored in the data bases. Organizations can use these techniques for acquiring new customers, fraud detection in real time, providing segment based products for better targeting the customers, analysis of the customers' purchase patterns over time for better retention and relationship, detection of emerging trends to take proactive approach in a highly competitive market, adding a lot more value to existing products and services and launching of new product and service bundles. The organizations usually face various implementation problems, which should be addressed before going for the final execution. None of the data mining technique can solve all problems related to CRM. But by judicially selecting the data mining techniques and their proper implementation can prove to be a boon for the organization and they will be able to offer the right product to right set of customers through right offer and through right delivery channel, which will in turn lead to better customer relationship management.

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