Implementation of Data Mining Techniques for Strategic CRM Issues

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Abstract:
Customer satisfaction is the lifeline for the growth of any organization. Now a days, basic concept of marketing is not selling the product to customers but it is to reach to the hearts of the customers so that they can feel a sense of belongingness with the organization. The organizations and individuals having right access to the right information at the right moment of time will be the one to survive. In spite of having ever growing data bases the problem is that the organizations fail to fully capitalize the true benefits which can be gained from this great wealth of information, as they are not able to extract valuable information from these huge data bases. The solution lies in the use of Data Mining tools for customer segmentation and profitability, marketing and customer relationship management. This paper throws light on the underlying technology and the perspective applications of data mining in customer relationship management.

Keywords: Economic Growth, Data Mining, Risk Management, CRM.

Customer is considered as the king. 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 these days. The basic concept of marketing which was the production of goods as per the requirements of the customer 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 has evolved at a great pace. CRM can be defined as the process of predicting customer behavior and selecting actions to influence that behavior for the benefit of the company. [3]

With the growth of information technology and the use of this technology for the automation of business processes has increased the importance of CRM to many fold. The Organizations has invested a huge amount for automation and more over the invention of internet has drastically changed the concept of marketing. The era of e-commerce and e-business has given a new lease of life to business processes, where customer need not to meet the seller, but the products and services are sold online. CRM is crucial in the on-line business environment because face-to-face contact is impossible on the net and customer loyalty can wave away easily. As gaining customer loyalty becomes the focus in an E-business environment, it is not surprising that analysts have referred to CRM services as one of the hottest enterprise services today. For most small businesses, CRM occurs naturally, Customer loyalty and profitability are derived from the closely knitted relationships that small community businesses have with their customers. As businesses expand, however, that degree of intimacy is no longer available. As it is not realistic and cost effective for big corporations to know each customer individually, CRM must be achieved in an indirect manner for such organizations. They must predict the behavior of individual customers through the available transactional, operational and other customer information they have. In the present day environment, the huge amount of electronic data is being maintained by organizations around the globe. 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. The various commercial organizations are recognizing the need of generating relevant information out of the huge repositories of the data and they are trying to find out the ways and means to provide concise and crisp information as per the requirements. Working in this direction, the business intelligence systems have played a vital and significant role in making the organizations capable of achieving their business objectives, which includes customer retention, profitability and increase in efficiency. Since 1980’s the business houses are incorporating the concept of Management Information System, through which they are generating various kinds of reports, which are then presented and analyzed for the decision making with in the organization[4]. 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. With the rapid development in the hardware and software industry the terms like data warehouse and data mining are gaining importance, which basically equip the decision makers with the What if simulations. Data Mining enables companies to reach consumers with the right product and the right offer at the right time.

Data Warehouse and Data Mining: A Literature Review
According to the definition given by Bill Inmon- it is a subject-oriented, integrated, time variant and non-volatile
collection of data in support of management’s decision making process[1]. These data warehouses were able to bring in data from a range of different data sources, such as mainframe computers, minicomputers, as well as personal computers and office automation softwares such as spreadsheet, and integrate this information at a single place. So to facilitate the user to explore the benefits of operational data to its full extent. The major goals achieved by using data warehousing are:

1. It enables the users to provide an appropriate access to a homogenized and comprehensive view of the organization data which in turn supports forecasting and decision-making processes at the enterprise level.
2. Data warehouse helps to achieve information consistency. By bringing data from disparate data sources into a centralized repository.
3. The data warehouse provides a unified view of the organization's data. Users from across the organization making use of the data warehouse, all view a single and consistent version.[1,8]

To retrieve the data from these huge data warehouses, the concept of data mining is used by the organizations. Data Mining is defined as a process of analyzing the data from various perspectives and summarizing it into valuable information. Data mining assists the organizations to look for hidden pattern in a group and discover new relationship in the data.

Data Mining is defined as "the nontrivial extraction of implicit, previously unknown, and potentially useful information from data". It is basically “the science of extracting useful information from large databases” [1]. It is the process of using raw data to infer important business relationships. Data mining involves the use of sophisticated data analysis tools to discover previously unknown, valid patterns and relationships in large data sets. These tools can include statistical models, mathematical algorithms, and machine learning methods. Thus, data mining is not only collecting and managing data; it also includes analysis and prediction [8]. Data mining can be performed on data represented in quantitative, textual, or multimedia forms. Figure 1 shows the process of data mining.

**Figure 1**

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.
5. To increase customer retention.

**Various Data Mining Techniques are:**

1. **Association:**

It is the technique of finding patterns where one event is connected to another event, the association will help to guide the organization to make decisions regarding pricing, selling and to design the strategies for marketing. The association may be direct or in direct. Direct such as purchasing a pen and paper. That means when the customer buys paper then he/she will buy the pen also, this association will help the organization in designing the layout of store, by placing these two products adjacent to each other, which will lead to convenience to the customer and organization can use these results for designing the pricing decision and can give offers based on this study [7]. The organization can find that which customer buys which product most of the times together and hence can provide discounts based on the results.

2. **Clustering:**

This is the technique of combining the transactions with similar behavior into one group, or the customers with same set of queries or transactions into one group. This technique
of finding and visually documenting groups of previously unknown facts is called clustering [2]. For Example: The customer of a given geographic location and of a particular job profile demand a particular set of services, like in banking sector the customers from the service class always demand for the policy which ensures more security as they are not intended to take risks, like wise the same set of service class people in rural areas have the preference for some particular brands which may differ from their counterparts in urban areas. This information will help the organization in cross-selling their products, This technique will help the management in finding the solution of 80/20 principle of marketing, which says: Twenty per cent of your customers will provide you with 80 per cent of your profits, then problem is to identify those 20 % and the techniques of clustering will help in achieving the same[2,3].

3. Sequence or Path analysis:

This technique will help in finding out the patterns where one event leads to another event, such as the birth of a child and purchasing diapers, with the help of such information the organization can design strategies accordingly [6]. This technique of data mining will help in predicting the future trends and organizations can offer the products accordingly, like i f a customer has availed a home loan, then after some time he/she can be contacted again for buying furniture or refrigerator or TV etc. As these are the obvious requirements after the purchase of a home. By predicting customer needs in advance, businesses can then market their products in a better way. Customer satisfaction can also be improved through more effective marketing.

4. Forecasting:

This technique of data mining will help in discovering patterns from which one can make reasonable predictions regarding future activities [9], such as the prediction that people who join an athletic club may take exercise classes. The customers in the bank, who have taken loan for Maruti 800 in year 2000, may be contacted after 5 years for the loan for some latest brand of cars. Data Mining is developed with the goal of providing tools for automatically and intelligently transforming large amount of data in to knowledge relevant to users. The extracted knowledge is often expressed in the form of association rules, decision trees or clusters that allows one to find interesting patterns buried deeply in the data which facilitate decision making process. The behavior of the customer or in broader sense the behavior of the transactions can help the organization in finding the customers loyal to organization or the customers who are going to cheat the organization, and hence the organization can design the corrective and preventive measures accordingly.

How the techniques of Data Mining can be applied to CRM:

Data mining is used in CRM implementation. For any organization to earn profit, it is necessary to understand its customers. Understanding and responding to customers needs and improving customer service have become important element of corporate strategy. CRM has gained momentum in recent years. The data mining techniques are really a boon for the industry. 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 [3]. 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[1,3]. The profiling is usually done on the basis of demographic characteristics, life style and previous transactional behavior of a particular customer. Many data mining techniques search profiles of special customer groups systematically using Artificial Intelligence techniques. They generate accurate profiles based on beam search and incremental learning techniques. Data mining techniques can significantly improve the customer conversion rate by more focused marketing. Following are the applications of various techniques of data mining to CRM:

1. 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?

Customer acquisition is the number one issue for every company. As corporation increase budgets to attract and obtain new customers, data mining becomes a critical tool for profiling good customers, performing market segmentation, and improving the results of direct-marketing campaigns [7]. In almost all cases the organization needs to cover large number of areas in a given time. Data mining tools can solve these problems to a greater extent. These tools can provide the organization the relevant data which can be used by the organization to carry on its marketing campaign to acquire new territories and new customers. Instead of mass pitching a certain "hot" product, the customer service representatives can be equipped with customer profiles enriched by data mining that help them to identify which products and services are most relevant to callers, so instead of calling a large set of people, the focus will be on a particular set of people, which will reduce the cost of calling to large extent and probability of maturing
the calls will be more. The data mining techniques which can be applied in this phase are Clustering and associations.

2. 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?

The customer retention is another major issue which companies are facing these days.[3]. By reducing the customer attrition, the organization will increase its profits. Finding the new customers and exploring new territories need huge investment, so it is better for the company to satisfy the existing customers and they should try to strengthen the relationships with them. Customer turnover is a difficult problem to manage because it usually occurs without warning, because once the customer has decided to switch over to the competitor then the organization has left with almost no option to retain the customer. Data mining introduces a major paradigm shift to manage the shifting of customers by adding predictive capabilities. Data-mining tools can be used to model the patterns of past churning customers by examining billing histories, demographic information, and other customer data. Then, the same model can be used to predict other good customers who are likely to leave in the near future. Armed with this information, the marketer can proactively instigate campaigns to keep their customer, rather than fighting to get them back later.

3. 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 [3]. 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?

Reaching to the heart of the customers by providing more customized services can again be a success mantra for the organizations to survive. Unlike increasing market share, which focuses on obtaining a greater number of customers, increasing customer share refers to the notion when the customer avails more services from the same organization. Two common methods for this are customized product-launch campaigns, and cross-selling. The following tools of data mining can be used: Clustering, Sequence analysis and forecasting[6].

**Technological Support:**

From the technological point of view, various software’s implementing the data mining tools are available which makes the usage of these tools and techniques quiet easy. These software applications are making the job for end user quiet easy and sophisticated. Some of these tools are:

**STATISTICA Data Miner,**

A venture of StatSoft worldwide, is a revolutionary product in the data mining applications. It enables financial institutions to Detect patterns of fraud; Identify causes of risk; create sophisticated and automated models of risk, Segment and predict behavior of homogeneous (similar) groups of customers, Uncover hidden correlations between different indicators, create models to price futures, options, and stocks.

**11Ants Analytics Ltd**

is a venture of a company located in Hamilton, New Zealand. 11Ants Analytics is committed to making advanced data mining accessible to non-technical users. They have built incredibly powerful data mining software which is deceptively simple to use. This simplicity is important, as it means the software can be used by people who previously never would have considered mining their own data. 11Ants Model Builder upgrades Microsoft Excel into a powerful data mining tool. Anyone who can use Excel can mine data, and do so in a very familiar environment.

**Threats and Opportunities:**

There are various hindrances and obstacles which are being faced while implementing data mining techniques are;

1. various sources and through various angels, which needs the use of different data mining techniques in single query.

2. Some problems in organization need to explore data from Data from various sources is to be integrated to derive at a particular result. And moreover this data is heterogeneous in nature and while transferring the data, large amount of noisy data is also added which creates problem. So data...
is to be preprocessed by filtering the noisy data. This step is usually time consuming.

3. Privacy Issues are the greatest obstacles. There is war like situation between the data miner and the subjects, as while mining the data the privacy of the subject is at the sake.

4. The results obtained from the various data mining tools are subject to validation, as these are to be tested before acceptance.

5. While studying the customer behavior usually the purchasing or transactional behavior is considered, but this analysis needs deep study of customers and their circumstances.

6. The difficulty is faced in developing customer models and moreover the validation of these models is again a problem [6,7].

**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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