AN ANALYTICAL STUDY OF DATA MINING AS AN EFFECTIVE TOOL FOR CRM

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ABSTRACT

This research paper reflects the relationship between data mining and customer relationship management. Data mining technology allows marketing organizations to better understand their customers and respond to their needs. An attempt has been taken to analyze how Data Mining can be combined with customer relationship management to help drive improved interactions with customers. Acquisition of new customers along with retention of old customers is an increasingly pressing issue in today's ever competitive commercial era. This is relevant and important for sales and services related industries mainly. There has been a lot of literature available which has researched the application of data mining technology in customer segmentation. Building a sophisticated understanding of the profile of high-value customers can help to retain existing customers and target new prospects which are the key purposes of customer segmentation, customer retention and acquisition of new customers. The application of data mining technology is to identify customer churn trend for adopting different actions on customer retention and find out the ways to acquire new customers. This paper includes data mining techniques to segment customers into heterogeneous group by their survival advantage and help organizations adopting appropriate actions to retain profitable customers and to acquire new prospective customers according to each segment's churn trend. The paper clarifies how data mining and statistical modeling change things for the purpose of retention as well as acquisition of prospective new customers. There have been tremendous developments in information and communication technologies, the world over, which have fueled exchange of views, innovations, individual/institutional and customer relationship. On the other hand, there are equally developments in innovations, reforms and research in the fields of data mining also. Our aim is to provide a focus for developing a system to effectively and efficiently introduce a good customer relationship in all the sectors of economy.

Keywords: Data mining, Market segmentation, Customer retention.

INTRODUCTION

For most of businesses, the primary means of growth involves acquisition of new customers along with the retention of old profitable customers. This could involve finding customers who previously not aware of your product, were not candidates for purchasing your product, or the customers who has bought the product in the past from your competitors. Some of these customers might have been your customers in the past, which could be an advantage or a disadvantage (they might have switched due to poor services). Any kind of business which fails to assume and justify the needs and wants of customer cannot survive long. The way in which industries communicate with their customers has changed dramatically over the past few years. A customer's continuing business is no longer guaranteed. As a result industries found that they need to understand their customers better, and to quickly respond to their wants and needs. In addition to that the time span in which responses has to be made is shrinking. In present situation it is no longer sign of intelligence that when customer gives sign of dissatisfaction then action will be taken. To make business successful, Companies must be proactive and anticipate what a customer wants or getting knowledge about customers, marketers not only has to understand the value of collecting customer data, but also realizes the challenges of leveraging this knowledge to create intelligent, proactive pathways back to the customer. For this Data mining - technologies and techniques helps businesses to discard unrelated data for meaningful relationships, where they can anticipate, rather than simply react to, customer needs. To sustain the business a comprehensive study of what gives him the feeling of satisfaction is the need of hour and data mining can serve as an effective tool towards this purpose. The Customer is required for survival of any kind of business. Although a marketer with wealth of experience can often choose relevant demographic selection criteria, the process becomes more difficult as the amount of data increases. The complexities of patterns increase, as number of customers being increased along with details of each customer. The past few years have seen tremendous growth in customer databases, so the job of segmenting prospective customers is becoming overwhelming. Data mining can help in this process, but it is by no means a solution to all of the problems associated with customer acquisition and retention. The marketer will need to combine the potential customers list that data mining generates with offers that people are interested in. Deciding what is an interesting offer is where the art of marketing comes in.

LITERATURE REVIEW

The Data mining application in retention of old profitable customers and finding out the new prospects for sustainability of business has been realized by the business world. Lot of study has been done in this area as mentioned below:

Saarenvirta (1998) explores customer data mining and examine a critical success factor model for CRM implementation. Flynn and Arce (1997) discuss the case tool to support critical success factors analysis in IT planning and requirement determination. Chang (2001) discusses the CRM suits for medium to large enterprise. (Wong et.al, 2004) examines intelligent Data Mining for CRM. Berson et al (1999) explain about building Data Mining application for CRM, Siragusa (2001) argues about implementing Data Mining for better CRM. Mukhopadhyay and Nath (2001) emphasized on importance of measuring the efficiency of CRM systems and proposed an efficiency model for the same.

(Edward et. al, 2001) talks about the use of Data Mining for customer Relationship for timely decision. (Dickinson et al, 1985) emphasized setting priorities with CSFs. (Chen et al, 2005) find out the Data Mining application in CRM of credit card business. (Chen et al, 1996) gives an overview of Data Mining from the database perspective. (Kleissner, 1998) discusses data mining for the enterprise.

The work by Nisbet (2004) discusses about suitable Data Mining tools for CRM. Saarenvirta (1998) explores customer data mining. (Wong et al, 2004) examines intelligent Data Mining for CRM. Berson, Smith and Thearling (1999) explain about building Data Mining application for CRM, Siragusa (2001) argues about implementing Data Mining for better CRM. Mukhopadhyay and Nath (2001) emphasized on importance of measuring the efficiency of CRM systems and proposed an efficiency model for the same.

Building Data Mining Applications for CRM by Alex Berson (Dec 1999) aims IT managers with the information they need to make informed decisions in purchasing the data mining and warehousing solutions they need. This provides comparison and contrast to various approaches and also tools available for today's data mining which helps them develop a step-by-step plan for their own organization.

Another study on Data Mining for Customer Relation Management by Vikas Kharbanda & Parthasarathi Dasgupta (Sep,2010) attempts to explain key features of Data Mining and Customer relationship Management present new concept which is nurtured by present organization to primarily increase their effectiveness in handling the various needs & types of customers.

Berson et al (1999) recommended a simple method to evaluate the benefits of a data mining model for the CRM applications. Vince Kellen (2002) is of the view that how a company measures its CRM activities depends upon who is doing the measuring and what activities are being measured. Rigby and Ledingham (2004) suggested a model to calculate the cost of CRM. (King et al, 1998) evaluated the fourteen desktop data mining tools. (Collier

et al, 1999) describe a methodology for evaluating and selecting data mining software. Runsala (2003) describes a tool called Lou that is considered to overcome the limitations of the various data mining tools like the cost and user friendly aspect of the tools.

DATA MINING

Data mining is a system of searching through large amounts of data for patterns. It automates the detection of relevant patterns in a database. It has enjoyed great popularity in recent years, with advances in both research and commercialization. For year's marketers, statisticians have manually "mined" databases, looking for significant patterns. Data mining uses statistical and machine learning techniques to build models that predict consumer behavior. The leading data mining products are now more than just modeling engines employing powerful algorithms. The first and simple step in data mining is to describe the data. For example, one can summarize data's statistical attributes visually review data using charts & graphs and look at the distribution of field values in your data. But description of data alone cannot develop an action plan. One must build a predictive model based on patterns determined from known results and then testing of that model on results outside that original sample. This can be used for both classification and regression problems. It is also used frequently to identify a set of characteristics (called profile) that segments customers into groups with similar behaviors, such as buying a particular product. A special type classification can recommend items based on similar interests held by group of customers. This sometimes called collaborative filtering in data mining. In the past data mining suggested that it would eliminate the need for statistical analysts to build predictive models. But data mining software and technologies lacks the human experience and intuition to recognize the difference between a relevant and irrelevant correlation, so statistical analysts will remain in demand to assess model results and validate the plausibility of the model predictions.

CUSTOMER RELATIONSHIP MANAGEMENT

Customer relationship management is creating a team relationship among sales, marketing, and customer support activities within an organization. Shani and Chalasani define relationship marketing as **"an integrated effort to identify, maintain, and build up a network with individual consumers and to continuously strengthen the network for mutual benefit of both sides, through interactive, individualized and value-added contacts over a period of time".**

This means managing all customer interactions. Changes in the type of customers, their behavior and response to the product manufactured are likely to have immediate effect on the performance of a company and also have

implications for decision making relating to strategy setting for improving the relationship with customers in the future. It is recognized that not every customer is equally important to an organization in terms of his/her lifetime value, thus, customers need to be segmented in order to identify strategically important customers.

Growth Strategies International (GSI) performed a statistical analysis of Customer satisfaction data encompassing the findings of over 20,000 customer surveys conducted in 40 countries by Info quest.

The conclusions of the study were:

- A Totally Satisfied Customer contributes 2.6 times more revenue to a company as a Somewhat Satisfied Customer.
- A Totally Satisfied Customer contributes 17 times as much revenue as a Somewhat Dissatisfied Customer.
- A Totally Dissatisfied customer decreases revenue at a rate equal to 1.8 times what a Totally Satisfied Customer contributes to a business.
- By reducing customer defection (by as little as 5%) will result in increase in profits by 25% to 85% depending from industry to industry.

(Jutla et al, 2001) describe CRM as acquiring, analyzing and sharing knowledge about and with customers. (Bueren et al, 2004) is of opinion that CRM aims at leveraging investments in customer relation to strengthen the competitive position and maximize the returns. The reason for the attrition of the customer needs to be identified and effective measures to be taken to solve the problem. In practice, this requires using information about your customers and prospects to more effectively interact with your customers in all stages of relationship with them. We refer to these stages as the customer life cycle. The Data Monitors report titled "Analytical CRM," forecasts that global enterprise investment in analytical CRM will grow from an estimated $2.3 billion today to more than $3.8 billion in 2010. By employing analytical CRM analytics, businesses stand to gain a fuller understanding of their customers in order to serve them better, thus increasing customer longevity and generating more profit. Analytical CRM is the active collection, concentration and analysis of data gathered about the customer and his interactions with the business.

The customer life cycle has three stages:-

- Acquisition of new customers
- Increasing the value to the customers
- Retaining the good customers

DATA MINING AND CUSTOMER RELATIONSHIP MANAGEMENT

Customer relationship management helps companies improve the profitability of their interactions with customers, while at the same time, make the interactions appear friendlier through individualization. To succeed with CRM, companies need to match products and campaigns to prospects and customers-in other words, to intelligently manage customer life cycle. Most CRM software focused on simplifying the organization and management of customer information. Such software, called operational CRM, focuses on creating a customer database that presents a consistent picture of the customer's relationship with the company and providing that information in specific applications. These include sales force automation (SFA) and customer service applications (CSA), in which the company touches the customers. However, the sheer volume of customer information and increasingly complex interactions with customers has propelled data mining to the forefront of making customer relationships profitable. Data mining is a process that uses variety of analysis and modeling techniques to discover patterns and relationships in data that are used to understand what your customers want and predict what they will do. Data mining helps to select the right prospects on whom to focus, offer the right additional products to your existing customers and identify good customers who may be about to leave. This results in improved profits because of a greatly improved ability to respond to each individual contact in the best way and reduced costs due to properly allocated resources. CRM applications that use data mining are called analytical CRM.

Customer Acquisition and Data Mining

The traditional approach to customer acquisition involved a marketing manager developing a combination of mass marketing (magazine advertisements, billboards, etc.) and direct marketing (telemarketing, mail, etc.) campaigns based on their knowledge of the particular customer base that was being targeted. The ads could also be placed in more mainstream publications whose readership demographics (age, marital status, gender, etc.) were similar to those of new parents.

In the case of traditional direct marketing, customer acquisition is relatively similar to mass marketing. A marketing manager selects the demographics that they are interested in, and then works with a data vendor to obtain lists of customers who meet those characteristics. The data vendor has large databases containing millions of prospective customers that can be segmented based on specific demographic criteria (age, gender, interest in particular subjects, etc.).

Before the new customer acquisition process begins, it is important to think about the goals of the marketing campaign. In most situations, the goal of an acquisition marketing campaign is to turn a group of potential customers into actual customers of your product or service. There are usually many kinds of customers, and it can often take a significant amount of time before someone becomes a valuable customer. When the results of an acquisition campaign are evaluated, there are often different kinds of responses that need to be considered. The responses that come in as a result of a marketing campaign are called "response behaviors. **"A response behavior defines a distinct kind of customer action and categorizes the different possibilities so that they can be further analyzed and reported on."**

ANALYSIS WITH THE HELP OF DATA MINING

Data mining revolves around the data that is used to build predictive models for the acquisition of customers. The amount of information that you have about people that you do not yet have a relationship with is much more limited than the information you have about your existing customers. In some cases, the data might be limited to their address and/or phone number. The key to this process is finding a relationship between the information that you do have and the behaviors you want to model. Most acquisition marketing campaigns begin with the prospect list. A prospect list is simply a list of customers that have been selected because they are likely to be interested in your products or services. Sometimes, it is necessary to add additional information to a prospect list by overlaying data from other sources. In terms of a potential data mining analysis, the information contained in the prospect list is very weak. There might be some patterns in the city, state, or Zip code fields, but they would be limited in their predictive power. To augment the data, information about customers on the prospect list could be matched with external data. One simple overlay involves combining the customer's Zip code with a country's census data about average income, average age, and so on.

More complicated overlays are also possible. Customers can be matched against purchase, response, and other detailed data that the data vendors collect and refine. This data comes from a variety of sources including retailers, state and local governments, and the customers themselves. If you are mailing out a car accessories catalog, it might be useful to overlay information (such as make, model, year and so on) about any known cars that people on the prospect list might have registered with their department of motor vehicles.

EVALUATION OF TEST CAMPAIGN RESPONSES

After starting the test campaign, the job of collecting and categorizing the response behaviors begins. Immediately after the campaign you need to track responses. After the sufficient amount of time, there is

threshold after which you no longer look for responses. At that time the customers who did not responded are considered as "non responses". Before the threshold, customers that did not responded considered in between a response and a non response.

CREATING DATA MINING MODELS USING RESPONSE BEHAVIORS

When you have test campaign data in hand, then you can start actual mining of response behaviors. Firstly it requires which behaviors you are interested in predicting. Say if all catalogs are same for clothing purchases, binary response prediction is the way to go. If separate men's and women's catalogs are available, analyzing response behaviors at the gender level would be appropriate. In some circumstances, predicting individual response behavior might be an appropriate course of action. With one-to-one customer marketing, the idea of catalogs that are custom-produced for each customer is moving closer to reality. By internet or telemarketing you can be more specific in the ways you target the exact wants and needs of your prospective customers. A significant drawback of modeling of individual response behaviors that the data mining process need to be carried out multiple times , once for each response behavior that you are interested in.

HANDLING OF NEGATIVE RESPONSES

Prior to data analysis ways to be thought to handle negative response behaviors. There are two kinds of negative responses: rejections and non-responses. Rejections are specific records in the database that indicate negative customer response. Non-responses correspond to absence of a response behavior record in the database for the customers who received the offer.

There are two ways to handle the non-response behaviors. The common way is translate all the non-responses into rejections. This will create a data set of all customers who received offers, with each customer's response being positive (inquiry or purchase) or negative (rejections and non-responses).The second approach is leave the non-responses out of the analysis data set. This approach is not typically used because it throws away so much large amount of data, and there is the possibility if the rejections are large (relative to the number of non-responses); experience has shown that non-responses not necessarily correspond to a rejection of your offers. Once the data has been prepared the actual data mining can be performed. The target variable that the data mining software will predict the response behavior type at the level you have chosen (binary or categorical). A model (or models, if you are predicting multiple categorical response behaviors) will be produced that will predict the response behaviors that you are interested in. The models then can be used to score lists of prospect customers in order to select only those who are likely to response to your offer.

LENGTHENING & STRENGTHENING THE RELATIONSHIP WITH YOUR TOP CUSTOMER

To lengthen & strengthen your customer relationships, data mining may answer these questions:

- Which customers in particular do you want to keep attached to your organization?
- Which customers are switching to your competitors?
- Which customers are dissatisfied with your services and products?
- Which customers will drive most of your profits?
- Which customers are loyal to your organization?

CUSTOMER RETENTION

Retention of customers is always been a matter of discussion for all types of businesses. Harvard study suggests: "Reducing customer attrition by 5 percent can double a company's profits." The high cost of finding new customers, a key issue for many organizations is customer retention. Often referred to as chum, customer turnover is a difficult problem to manage because it usually occurs without warning. Data mining introduces a major paradigm shift to churn management by adding predictive capabilities. These 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.

DEEPENING THE RELATIONSHIP WITH THE CUSTOMER TO RETAIN THEM USING DATA MINING

To retain the customers to your organization relationship with them must be deepen. Data mining tools are required to answer essential question like:

With which customer can you increase the share?

Which product and services interest a particular customer?

Which products are typically bought together and which ones are most frequently bought?

Which cross selling opportunities should you consider?

How to increase life time customer value?

Answers to these questions are helpful in intensifying and deepen the customer relationships?

INCREASING LIFE TIME CUSTOMER VALUE

Life time customer value is a reflection of the possible future business company can expect from a loyal customer. This will include not only repeated purchases by the customer, but also his family purchases, referral purchases etc over a long period of time. It should also consider the future product introductions of the company for which this loyal customer is a ready prospect. This adds more dimensions to the exact assessment of the life time customer value. For example consider customers of a bank who use the institution for checking account. An analysis reveals that after depositing large amounts, some customers wait for their funds to clear before moving the money quickly into their mutual fund accounts or stock-brokerage accounts outside the banks. This will be a great loss to the bank. To persuade these customers to keep money in the bank marketing manager can use tools like campaign management software to identify immediately large deposits and trigger a response. The system might automatically schedule a direct mail or telemarketing promotion as soon as a customer's balance is exceeds a predetermined amount. Based on the size of the deposit, the triggered promotion can then provide the appropriate incentive that encourages customers to invest their money in the bank's other products. The closer the data mining and campaign management work together, the better the business results.

CROSS SELLING

Growing a customer's value is yet another critical marketing function. The notion of increasing customer share is key to most organizations. Unlike increasing market share, which focuses on obtaining a greater number of customers, increasing customer share refers to getting more of the dollars each individual customer has to spend. Two common methods for this are customer-based product-launch campaigns, and cross-selling.

Before implementing data mining tools an organization may reluctant to cross sell. Without a data mining model the chances of making right recommendations are less. And, because making any recommendation without being predicting customer buying behavior is unacceptable as it may leads to substantial number of complaints. Data mining can change the situation as data mining model operates on the data. Using the customer information in the database and the new order, it tells the customer service representative what to recommend, the process experienced virtually no complaints or comparative less complaints. Data-mining tools improve product launches to an installed base, as well as cross-selling activities by helping marketers understand which customers are most likely to purchase new products, and which products are typically purchased together. This results in a more focused effort to customers ready to spend additional dollars. In summary, data mining helped better understanding its customer needs. When data mining models were incorporated in typical cross selling CRM campaign, the models help increasing the profitability.

PERSONALIZATION

Personalization provides relevant and specific recommendations for individuals, taking into account personal preferences, demographics, and behavior. Personalization permits delivering recommendations with the touch and timing of someone who knows you well. Personalization uses data mining technology to analyze the large amounts of data gathered from Web sites and other applications to find patterns within purchase, demographic, ratings, and navigational data.

It makes recommendations using data mining technology without the need to explicitly define manual rules. Personalization collects customer profile data and uses them to build predictive models that support personalized recommendations. CRM analytics can be explored with the following example of HDFC Bank, where they use data mining as a tool for customer retention by building better customer relationships. **In India, HDFC Bank** is using the techniques of data mining to retain the customers. HDFC Bank taps their customer base and offers them various other services. For example: If you are having an HDFC Bank Account, you have special privilege offers from the bank for new services like Home Loans, Car Loans, Credit Cards, Personal Loans and others. HDFC Bank has also got Loan on Phone Scheme and Pre Approved Offers into each of their services; so that the relationship with the customer can not only be maintained, but will also make them more loyal of offering new services. Ultimately in the long run, the business of HDFC Bank will grow manifold by using the data mining techniques.

RETAINING THE CUSTOMERS VIA DATA MINING- AN ILLUSTRATION

For almost every company the cost of acquiring a new customer exceeds the cost of keeping good customers. To face this challenge the first thing any organization has to do is prepare a data used to predict which customers would leave. Organization need to select the variables from its customer database and perhaps transform them. Next, it is needed to identify who are "good" customers. This is not a data mining question but a business definition (such as profitability or life time value) followed by a calculation. Now building a model to predict which the profitable customers are would leave. In most data mining problems, determining what data to use and how to combine existing data is much of the challenge in model development. Predicting who would churn however isn't enough. Based on the result of modeling there must be identification and implementation of some potential programs and offers that it believed would entice people to stay. For example in case of internet users some churners were exceeding the largest amount of usage available for a fixed fee and were paying substantial incremental usage fees. An internet service provider company may offer these users a higher fee service that

included more bundled time. Some users were offered more disk space to store personal web pages. The service provider then built models that would predict which would be most effective offer for a particular user.

CONCLUSION

The researcher tried to present the application of the Data Mining tools in CRM. The paper attempts to present the competitive advantage of applying Data Mining tools in CRM. Organization should incorporate the best Data Mining tools to remove the short comings in their companies. An in-depth knowledge of customer's information is essential for competitive advantage. An attempt has been done in successful implementation of Data Mining tool in the organization that can improve the relationship of the customer with the company, which is the demand of the present business environment. The companies will be able to analyze the customer data and understand their customer effectively and efficiently. It is concluded that Data Mining tools can provide CRM with better understanding of customer relations and improved customer satisfaction, higher profitability for the company and higher probability of attaining competitive advantage. This creates an atmosphere in the companies which helps the executives to take better decision towards the success of the firms. Building better relationship with your customer is essential to acquire new and retention of the existing ones. More effectively you can use the information extracting from data mining techniques about your prospective or existing customers to meet their needs the more profitable will be. Customer relationship management with data mining techniques provides the business a cutting edge to acquire and retain the customers by enhancing the relationships. Data mining serves as a guiding factor in paving the path of success for business and other numerous national/international corporations and organizations.

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