

Marketing Development by Using CRM Mining Techniques

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Abstract:

Customer Relationship Management (CRM) is a process that manages the interactions between a company and customer. The primary users of CRM software applications are database marketers. Who are looking to automate the process of interacting with customer? Data mining applications process of searching the mountains to find patterns that are good predictors of purchasing behaviors. This separation of the data mining and campaign management software introduction considerable inefficiency and opens the door for human errors. Tightly integrating the two disciplines presents an opportunity for companies to gain to gain competitive advantage.

Keywords — Operational CRM, Analytical CRM, Collaborative CRM .

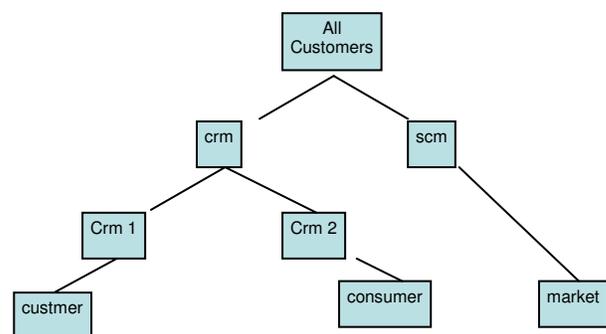
I. INTRODUCTION

Companies must spend far more money to get a new customer than to retain an existing customer. It is far more expensive to win back a customer after they have left than it is to keep them satisfied in the first place. In this far easier to sell a new product to an existing customer then it is to a new customer. Some customers are vastly more profitable than other customers. Some customers are unprofitable, and some customers are unprofitable and will never be profitable. The good news is that business value can now be measured at the individual level. This is possible because of the development of new technology that now provides a unique opportunity that many companies are rushing to exploit. These companies are seeking to move from single sales models to continuing selling relationships with their customers. They are seeking to understand how to build and maintain a loyal customer relationship, and to discover the most profitable way to build that relationship. Only a small portion of a customer's positive feeling and loyalty are generated by your products. The rest comes from the intangibles: service, store experience, etc. Companies need to know their customers; preferences-not only for products, but also for style, service, and image. They need to manage the relationship with each and every customer, and make each as profitable as possible. Those companies that are successful with find increased revenue at lower cost of sales and marketing, and decreased cost from lost customers and ineffective sales and marketing. The methodology that makes this possible is called Customer Relationship Management, or CRM.

II. CUSTOMER SEGMENT LEVEL:

Data mining is used for segment a variety of ways. First, it can be used to define customer segment based on their predicted behavior .for instance, the leaf notes of a decisions tree can be viewed as individual segment .Each one for all customer meeting those characteristic, there is some predicted behavior (for instance, the likelihood to respond to the free flashlight promotion) If decision trees are used to

create segment, Then the data is guaranteed to be mutually exclusive falls into more than one segment and every customer falls into guaranteed to be contained in one of the segments)how level tree make:



III. TYPES OF CRM

Strategic CRM:

The aim of strategic CRM is to concentrate and enhance the knowledge about customers and use this knowledge to improve and customize the interactions with customers to maintain a long-term relationship with them.

Determining and development of CRM strategies involves following steps:

Amplify Commitment- Strategic CRM involves almost all the departments of an organization e.g. finance, sales,

manufacturing, distribution, marketing etc. Hence it is essential to get support and use their important feedback while determining strategies. For this each and every department should be kept informed about all the developments and implementation of processes carried out or performed. Everyone should also be emphasized about the positive approaches and end results of the strategies.

Building valuable project team- After organizational commitment is secured the next important stage in developing CRM strategies is building a determined and valuable project team. Each and every member of this team should be experiences and dedicated professional as these members will be the key decision makers in the whole process. They will be responsible to communicate all the related details and benefits of the CRM strategies to all the members of the organization. These members should be from following work groups to ensure all the aspects of strategies are addressed efficiently;

Management- Management professionals are responsible to provide motivation, leadership and management at every strategic development step especially when a change in business process or organizational structure is expected.

Technical- Automation of CRM strategies are important and must involve experienced technical hands. Also technical professional provide their useful contribution in building and managing software application and determining their compatibility with existing software features.

Sales and Marketing- These are final users of CRM system once the strategies are determined and implemented. The applied strategies are supposed to be successful once these users fell comfortable and satisfied by using all the CRM features. Being the end users these people are also responsible to provide useful feedbacks on

efficiency and effectiveness while the strategies are in development phase.

Financial- The CRM strategies must also be gone through or evaluated under financial aspects. The financial professionals of the team can provide crucial analysis on assessment of enhanced productivity, evaluation of operational and production cost and final estimated cost of the project. They also help in assessing the investment cost per module or segment so that the product is delivered inside the budget.

External Experts- Many times some external consultants and other CRM vendors are substantially helpful in strategy development. These are people who are generally hired or outsourced for second fruitful opinion or if the organization is lacking with sufficient CRM experts. These professionals have vast experience in the same field and helps analyzing organization's actual business needs, work with other professional to review and approve complex business structure and even helps in formulating the team members according to the expertise they posses.

Requirement Analysis- CRM strategies should always focus and concentrate on the actual business requirements. This process involves a series surveys and questionnaires with top level sales, marketing and financial managers to gather the actual expectations regarding the strategies to be implemented and what results these strategies will throw in the final stage. This is a very crucial factor in the development of an effective CRM system because if the results are not matching the actual requirement or if they diverge from focus points, then that means it's not achieving the desired goals.

Operational CRM:

Operational CRM is mainly focused on automation, improvement and enhancement of business processes which are based on customer-facing or customer

supporting. The main importance of a CRM system lies on how the selling, marketing and service oriented processes are automated, and for which operational CRM systems are embedded with following major automation **applications:**

Marketing automation- As the name implies, marketing automation is basically focused on automating marketing processes. In marketing, campaign management involves marketers to use customer specific information to determine, evaluate and develop communications that are targeted to customers in individual as well as multilevel or multichannel environment. Campaigns developed to communicate customers individually are easy and involves unique and direct communications. For multichannel environment the implementation of marketing strategies and campaign management is quite difficult and challenging. For example, some retailers have multichannel transactions like shops or stores, wholesale stores, websites, home shopping and even television shopping. Here integration and implementation of communication strategy is difficult and evaluation of performance and quality of campaigns needs to be automated and should be technologically sound across each of the channels. For handling this, a CRM marketing strategy called event-based marketing is inherited. Using event based marketing communication and offers are presented to customers as and when they are required. For example, credit card customer calls the call center for inquiring the current interest rates, this indicates that customer is specific about the interest rates and is trying to compare the interest rates and may switch to different competitor to find specific deals which suits him. Without wasting time the automated CRM system pops up an event of offer which is best suited for that customer and helps to retain him back.

Sales-force Automation- A CRM system is not only used to deal with the existing customers but is also useful in

acquiring new customers. The process first starts with identifying a customer and maintaining all the corresponding details into the CRM system. This process can be distributed into many stages which includes generation of lead and then qualifying those leads as prospects. The Sales and Field representatives then try getting business out of these customers by sophisticatedly following up with them and converting them into a winning deal. Automation of selling process is efficiently handled by Sales-force automation which automates all the methodologies or sales cycle and above described process sophisticatedly.

Service Automation- Service automation deals with managing organization's service. The actual interactions with customers such as contact, direct sales, direct mail, call centers, data aggregation systems, web sites and blogs etc. are examples of operational CRM. Each interaction with a customer can be collected to the client database generally known as 'customer's history' and the information can later be used wherever necessary. Any one in the organization can have access to this information about customer which gives a clear view of customers needs and important information on the customer such as products owned, prior support calls etc. It naturally eliminates the need to obtain this information individually from the customer. On the basis of the information, if required, the customer can easily be contacted at right time at the right place.

Analytical CRM:

Analytical CRM supports organizational back-office operations and analysis. It deals with all the operations and processes that do not directly deal with customers. Hence, there is a key difference between operational CRM and Analytical CRM. Unlike from operational CRM, where automation of marketing, sales-force and services are done by direct interaction with customers and determining

customer's needs, analytical CRM is designed to analyze deeply the customer's information and data and unwrap or disclose the essential convention and intension of behavior of customers on which capitalization can be done by the organization. Primary goal of analytical CRM is to develop, support and enhance the work and decision making capability of an organization by determining strong patterns and predictions in customer data and information which are gathered from different operational CRM systems.

The following are the key features of analytical CRM:

Seizing all the relevant and essential information of customers from various channels and sources and collaboratively integrating and inheriting all this data into a central repository knowledge base with a overall organization view.

Determining, developing and analyzing inclusive set of rules and analytical methods to scale and optimize relationship with customers by analyzing and resolving all the questions which are suitable for business.

Implementing or deploying the results to enhance the efficiency of CRM system and processes, improve relationship and interaction with customers and the actual business planning with customers. Combine and integrate the values of customers with strategic business management of organization and value of stakeholders.

Customer Analytics- This is the base analytic used to analyze customer knowledge base. It provides a better view of customer behavior and by modeling, assessing customer values and assessing customer's portfolio or profiles and creates an exact understanding of all the customers.

Marketing Analytics- This helps discovering new market opportunities and seeks their potential values. It also helps in managing marketing strategies and scale and plan marketing performance at district, regional and national

levels. Marketing analytics also focus on campaign management and planning, product analysis and branding.

Sales Analytics- Sales analytic provides essential environment to plan, simulate and predict sales volumes and profits by constantly analyzing organizational sales behavior. It helps in pipelining all the selling opportunities in an efficient way by indulging and improving the sales cycle.

Service Analytics- Analytical CRM has major role in enhancing the services which answering all the questions regarding customer satisfaction, quality and cost of products, complaint management etc. It even helps in improving and optimizing the services by sophisticatedly analyzing the service revenue and cost.

Channel Analytics- This type of analysis helps to determine the customer behavior on channel preferences, like web channel, personal interaction, telephone channel etc. This information is efficiently integrated in customers' knowledge base so that they can be contacted accordingly.

IV. DEVELOPMENT OF CRM BY ASSOCIATION RULES

CRM Based Association Rule Mining

A data stream is a huge limitless sequence of data elements continuously generated at a rapid rate. Use of knowledge discovery algorithms that require only one scan over the stream is necessitated by the continuous characteristic of streaming data.

The concept of association rule is originated from the market basket analysis which aims to identify frequent item sets in a supermarket shopping.

The main idea is to find products that are frequently bought together for improving marketing strategies. Besides the market basket analysis, cross selling programs are also introduced as another common use of association rule mining. This technique is ranked after

neural network and decision tree among the data mining tools which have been used for CRM.

An association rule is presented in the form $A \rightarrow B$, where $A \cap B = \emptyset$. A is the antecedent of the rule and B is its consequent. It means that when A occurs, B occurs with certain probability. The strength of association rules is often evaluated by means of the support and confidence measures.

Data mining refers to extracting or mining of knowledge from huge quantity Classification, regression, clustering and dependence modeling are some examples for data mining tasks. Of these an important role is played by clustering in data mining. The clustering process forms valuable groups or clusters by classifying data objects, records, documents, such that characteristics of any two object is identical if they belong to the same group and different if they belong to different groups.

Customer relationship management methodology

The main aim of our proposed technique is to maintain a good relationship between customers and companies through monetary offers that are based on the revenues provided by those customers. So, this relationship is maintained by using the historical database which contains the information about the customers stored during their visit to our company for buying products or some service purposes. The information stored in the database is processed by using the data mining and PSO. Our proposed study is composed into three stages:

- Querying
- Association Rule Mining using Apriori
- PSO- bases customer selection process

The structure of the proposed CRM system

The Customer information in the historical database has four fields: Date, Number of transactions,

Customer ID and Profit and feedback. The customer information is stored in the field Customer ID and their date of arrival is stored in the field date, number of transactions done by the particular customer is stored in the field Number of transactions. Profit is the company revenue given by the particular customer.

Querying:

In this first stage, the customer information is extracted from the database by performing a query process. The extracted customer information is a set of tables which contain set of fields are number of transactions, customer id and customer profit of the respective customer. For each customer in the database, the extraction process is performed to obtain the customer information for the mining process. The pseudo code of the querying process is described as follows.

```
V ← Cid
Traversing through Cid
If V = (Cid elements) then
Cid elements @ X
Delete the record from V
Repeat until all the same records are deleted
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As a result of querying process, we obtain the information of the individual customers.

Association rule mining using apriori algorithm

In this stage, we discuss the association rule mining Apriori algorithm that is used in analyzing the customer data to find the frequent items or customers from the transaction database. Consider an association rule is given in the form $X \rightarrow Y$, where X and Y are items. These item sets have no common elements i.e., $X \cap Y = \emptyset$. X is the antecedent of the rule and Y is its consequent. It means that

when X occurs, Y also occurs with certain probability. Apriori algorithm is the best-known association rule mining algorithm. This algorithm generating frequent items i.e., generating frequently bought products by particular customers and finding the association rules from the frequent item sets.

PSO-based customer selection process:

In the proposed CRM system, we use the PSO methodology to obtain optimum number of customers among a large customers obtained from ARM. Here, the qualified customer's are selected based on profit and frequency levels. For optimization problems, PSO algorithm is a best approach often used by most researches. Use of this algorithm we will efficiently maintain the customer relationship. Using this procedure we select the optimal customer to maintain the customer relationship. The flow of procedure is discussed below. PSO defines that each particle has a potential solution to a problem in D- dimensional space. We randomly generate initial particles for customers and velocities for each particle.

Randomly generated initial particles are:

$$P = (p_1, p_2, p_3, \dots, p_i) \quad i = 1, 2, 3, \dots, N$$

where, $p_{lb} < p_i < p_{ub}$

where, P is a particle, lb p and pub are upper and lower bound values of the number of particles. The randomly generation of initial particles size N i.e., N number of customers are generated randomly.

Hence each particle has a velocity which can be represented as:

$$V = (v_1, v_2, v_3, \dots, v_i) \quad i = 1, 2, 3, \dots, N$$
$$V_{min} < v_i < V_{max}$$

Velocity is represented as V, v_{min} and v_{max} are the minimum and maximum values of velocity respectively.

The all particles are done in above specified particular intervals, no one particles does not exceed the

specified interval. Before each and every iteration if we check the particles intervals.

V. CONCLUSION

In this paper, we proposed a set of techniques for mining and summarizing product reviews based on data mining and natural language processing methods. The objective is to provide a feature-based summary of a large number of customer reviews of a product sold online. Our experimental results indicate that the proposed techniques are very promising in performing their tasks. We believe that this problem will become increasingly important as more people are buying and expressing their opinions on the Web. Summarizing the reviews is not only useful to common shoppers, but also crucial to product manufacturers. CRM strategy, enabled by processes and technologies, is architected to manage customer relationships as a means for extracting the greatest value from customers over the lifetime of the relationship. CRM, which recognizes that instead of managing customers, the role of the business is to facilitate collaborative experiences and dialogue that customer's value. Experimental results show the effectiveness of the proposed approach. In our future work, we will make an experiment on our purposed method for improving accuracy.

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