Using Data Mining Techniques to Increase Efficiency of Customer Relationship Management Process

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Abstract: Recently the Customer Relationship Management (CRM) has been achieved an increasing popularity in business management. CRM includes all the steps which an organization employs to create and establish beneficial relationships with the customers. Using technologies such as data warehousing and data mining CRM can be introduced as a new area where companies can gain the competitive advantage. Via CRM system a company can improve its processes to deliver better service at a lower cost. By use of data mining techniques, companies can extract hidden information of the customers from large databases. So, organizations can determine the value of customers and predict their future behavior and requirements. Data mining tools can answer business questions which were time-consuming to track in the past. We believe that it is possible to improve CRM efficiency, to have an effective and rapid response to customer needs, by integrating CRM and data mining techniques. In this study we investigate major concepts of CRM and data mining. Also we introduce our idea to employ data mining techniques in CRM. This study show that using data mining techniques in CRM will improve CRM's efficiency and provide a better prediction ability to companies, organizations and industries to achieve more Profitability.

Keywords: Attract customers, customer retention, data mining, CRM

INTRODUCTION

In recent years, mass production and new marketing techniques has changed the concept of traditional competition in the market. Today, customer's access ability to products is increased. In this increasingly competitive situation of the market, 1 of the most important tenets for organizations is to maintain in relationship with their customers, in order to protect their long term interest (Basiri, 2007). Nowadays, only the companies which modify their viewpoint about marketing can achieve to more prominence and high level of success and popularity. In today’s competitive marketing, the companies must change the theories which were only based on producing and selling. They should focus on new marketing theories which are based on new marketing methods and customer rights (Alaee, 2008). CRM is 1Of the systems which may have a significant influence on organizational decision-making. CRM helps companies to gather information based on current and future customer needs and demands (Behrouzian Nejad, 2011). With CRM system a company can improve its processes to deliver better service at a lower cost (Behrouzian Nejad et al., 2010). Indeed, in today’s global economy, CRM issues have inspired organizations to rethink in their old strategy to communicate with customers and capture a wide range of knowledge. The process of data collecting and processing grows rapidly. So, in order to survive in today's competitive marketing, companies significantly require to analysis huge amounts of customer’s data. The company's most valuable asset is the information which is related to customer buying patterns. Ability to improve knowledge about customers and markets will enable the business owners to better offer their services and products (Behrouzian Nejad et al., 2011; Taghva et al., 2009). Data Mining is one of the recent advances in data management technology. Data mining techniques are used in search of consistent patterns and/or systematic relationships between variables in business. The process of Data Mining is discoveries and trends hidden in large volumes of data into a database format, data storage, or storage of any data stored (Bolboaca and Jäntschi, 2007). Data Mining is a technique that can help companies to move towards customer-oriented marketing.

The aim of this study is to show that it is possible to improve CRM efficiency, to have an effective and rapid response to customer needs, by integrating CRM and data mining techniques. So, to do this, we will
investigate major concepts of CRM and data mining in this study. We believe that using data mining techniques in CRM can improve CRM’s efficiency. So, it can provide better prediction ability to companies, organizations and industries to achieve more Profitability.

**Customer Relationship Management (CRM):** CRM (which sometimes called customer management, customer value management, customer-oriented or customer-oriented management) includes a set of processes and systems that supports business strategy to provide long-term and profitable relationships with customers (Taghva et al., 2009; Lin and Yen, 2001). Customer’s data and information technology tools are the primary factors for any successful CRM. Furthermore, rapid internet growing and its related technologies have changed interaction and communication ways between companies and their customers. So the opportunities for marketing has been increased today (Ngai et al., 2009). Although the CRM has been widely recognized as an important method to business development, but There is no a universally accepted definition for it. In (Ngai et al., 2009) defined CRM as "enterprise approach to understanding and influencing on customer’s behavior through meaningful communications, in order to attract customers, customer retention, customer loyalty and customer profitability". This definition emphasizes the importance of CRM as a comprehensive process to attract and retain customers, to increase customer value for organization.Aspects of CRM According to Taghva et al. (2009) and Lin and Yen (2001), the CRM consists of four steps: Customers identification, attracting the customers, retaining the customers and development of customers. These four steps can be considered as closed-loop for CRM.

- **Customers identification:** CRM initiate with the identification of customers. This phase includes finding the target population, the population which may be favorite and profitable for our organization. This phase include the customer analysis and customer classification steps. Analysis of customers includes searching for profitable customers via their basic features. The customer classification includes dividing customers into smaller groups. In this step relatively similar customers will classified in a same group.

- **Attracting the customers:** After identifying the potential customers, the organizations can directly try to attract customers. An element to attract customers in direct marketing is defining a process that encourages customers to order their favorite products through various channels. Direct e-mails or coupon distributions are examples of the direct marketing.

**Customer development:** This phase includes increasing number of transactions, transaction value and customer profitability. Elements of customer development are: analysis of customer’s life-time value, cross and up sale, refers to promotion activities which their goal is to increase the numbers of services a customer will get in the company. Market analysis goal is to maximizing customer’s transactions and reveal trends in customer’s behaviors.

**CRM approaches:** The first requirement for successful implementation of the CRM is clarity about the concept of the CRM. Among the various approaches which exist in this area, the following three areas are Separable (Behrouzian Nejad et al., 2010):

- Operational CRM: This approach supports face to face operations and activities with customers. For example, staff of phone answering centers.
- Analytical CRM: this approach is based upon Operational CRM. It provides analytical information about customer segmentation, customer’s behavior and customer’s value.
- Collaborative CRM: this approach focuses on relationship integration with customers using the appropriate communication channels (multi-channel management). For example, integration of electronic markets and telephone answering centers.

CRM is recognized as a Central Customer Management approach, so that information system provides necessary information to support CRM processes in the 3 categories: Operational CRM, Analytical CRM and Collaborative CRM. Companies can increase customer profitability and customer retaining using CRM.

**Importance and benefits of CRM:** Customer retaining is a very important issue in all industries, especially in small and medium industries. Because in these industries the resources are limited. In addition, dissatisfied customers makes the organization vulnerable. Because they damage organization’s competition, also they try to convince other customers to avoid transaction with the organization. It is clear that CRM is an important issue in the business world. Primary researchers of CRM believed interests and benefits of CRM can be searched based on each industry’s structure separately. But the results of the recent investigations in several countries and industries show that the interest of CRM in different industries and countries does not change very much. The main advantages of CRM can be stated as below: Behrouzian Nejad (2011) and Doaee and Dabagh (2010):
Improve capabilities in targeting profitable customers.
Virtual integration of communication with customers.
Improve sales force efficiency and effectiveness.
Personalized marketing message.
Make products and services proportional (especially storage).
Improve efficiency and effectiveness in customer services.
Improve pricing capabilities.

DATA MINING

Data mining is 1 of the recent developments in line with data management technologies. In fact we could say that data mining is a relatively new scientific research area in the field of statistics, machine learning, database management science (Peyrovan et al., 2009; Berson et al., 2004). The function of data mining is discovery the knowledge hidden in large volumes of data into a database format, data storage, or storage of any data stored. Each database contains a huge number of data and information. Extracting hidden knowledge form stored data and information in databases can be vital and important in business and marketing. This extracted knowledge can help and support companies and organization to make better and more intelligence decisions. So, in this way we can create powerful decision support systems which help organizations to improve their business and marketing processes. Figure 1 shows the process of knowledge discovery from data warehouse (Behrouzian Nejad et al., 2011).

In other words, in Bolboaca and Jäntschi (2007) Data Mining (DM), also called Knowledge-Discovery in Databases (KDD) or Knowledge-Discovery. In fact data mining is the process of automatically searching large volumes of data to find patterns, using some tools such as classification, association rule mining and/or clustering.

What can does data mining: Nowadays data mining is now ready to use with the support of three technologies. These 3 technologies are:

- Collecting and storage huge amount of data
- Computers with high processing power
- Advanced data mining algorithms

Data mining in recent decades has been developed very fast with the support of the technologies and sciences such as statistics, artificial intelligence and machine learning. Table 1 shows some of the application and methods of data mining (Akbarpour and Totochi, 2011).

Reasons and needs for data mining: Data management techniques have important role in the increased use of information and reduced storage costs (Behrouzian Nejad et al., 2011; Shahrabi and Shakoorinia, 2007). The volume of collected and stored data rapidly increased during the past decade. (The volume of data in the world become doubles each 5 years) (Taghavi and Naviri, 2006). With this rapid and dramatic growth of data which are collected and stored in numerous databases, we will need some powerful tools to analysis, perceive and understanding them. Without these tools collected and stored in databases are not efficient and useful. So, the database has become as a tomb for data. One other hand, decision making based on information stored in the database (in fact, based on hidden knowledge which can extracted from stored data in databases) may be more effective and more intelligent (Shahrabi and Shakoorinia, 2007). Amount of available data are doubling every 5 years. So organizations must be able to manage their data. Data mining is a very important and powerful method which can help organizations and companies to manage this large amount of data. Via data mining organizations are able to extract favorite and useful knowledge about customer's behaviors to develop and make better their business and marketing.

INTEGRATION OF DATA MINING AND CRM

The CRM is a main concept with multiple layers and data mining can be considered as an important layer of CRM. Data mining aid companies to move toward customer oriented methods. Customer's lifetime term

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refers to different levels of communication between customers and business. Understanding the customer's lifetime is an important issue, because it is directly in relationship with incomes and the customer's expected utility (Rygielski et al., 2002). Vendors believe that there are three ways to increase customer's value:

- Increase customer's purchases of products which have already bought.
- Sales of products which have higher benefit to customers.
- Customer retention for a longer period of time.

Customer's lifetime is a general framework to understand customer's behavior and include the following four basic steps:

- Prospects: Customers who are not among our customers now, but they are located in the target market.
- Responder: Customers who are located in the target market and are interested to use our products or services.
- Active Customer: People who have recently used our products or services.
- Former Customer: Bad customers who have not paid their bill, which creates a high cost or buy the products of our competitors.

Customer's lifetime offers a suitable framework to use data mining for CRM. From inner aspects, this cycle tells what information is available and from external aspects tells what is probably appealing for customers. Data mining can predict exploration profitability in some cases, such as activation of customers, the time they were active and how they are leave products or services. Data mining can be used over a period of time to accurately predict changes. Data mining aid organizations to identify the customer's data patterns. For example, a company can use Data mining to predict a specific event in customer's lifetime (e.g., retirement). Data mining plays an important role in the overall process of CRM that interacts with data center or data warehouse and also has interaction with the competition management software. There was manual relationship between Data mining software and competition management software in the past. It often involves the physical transcription from data models and transfers them into databases. This weak relationship between Data mining and software was caused underlying inefficiencies and human errors. Nowadays there are more tendencies to incorporate these 2 components to achieve competitive advantage (Basiri, 2007).

**ADVANTAGE OF USING DATA MINING IN CRM**

Some advantages of using Data mining in CRM are as follows (Basiri, 2007):

- Fast and accurate access to information for easy answer to customer questions.
- Refining data to eliminate duplicated data.
- Extraction, management and top-down access to data for customer's profitability analysis and achieving to customer retention models.
- Integrated data and advanced tools to data analysis for reporting.
- Calculate the percentage of overall value and estimate the future value for each customer.
- Response to rapidly changing business environments and customer needs.
- Increase customer's satisfaction and loyalty.
- Attract new customers and increase market share.

As mentioned in previous sections, CRM is 1of the most functional areas of Data mining. In general, data mining has been entered in all fields of CRM, especially in customer retention field (Ngai et al., 2009). This stage of the CRM is considered as central component of CRM cycle and has great importance. Customer satisfaction which refers to the difference between the customer's current situation and his expectations is considered as an essential prerequisite for customer retention. Customer's loyalty programs, which are located in this stage as one of the main components, include efforts and supportive activities with the goal of retention the long term relationships with customers. Customer's churn out analysis, quality of services and customer satisfaction measurement are considered as customer loyalty programs. According to studies, almost all data mining tools have been used in this field (Ngai et al., 2009; Ahmadvand et al., 2009).
DATA MINING AND ANALYTICAL CRM

Data mining is the process of extracting previously unknown information, explicit and potentially useful knowledge from stored data in data warehouses using pattern recognition techniques, mathematical and statistics methods (Ebrahimi and Farzad, 2010). Two main goals of the data mining are prediction and description. Predictive data mining provides a model from system which this model can be predicted by a set of specified data. Its overall goal is to provide a model for classification, prediction and estimation of data. Descriptive data mining offers new and non obvious information based on a set of data. Its overall purposes are understanding and analysis systems by using of patterns and relationships. CRM is one of the most important applications of data mining. CRM has played an important role in determining the strategies related to enterprise customers. CRM can be institutionalized with mining customer’s data and its analysis. Basically the goal of CRM is establishing a deep and strong relationship with customers to increase their value and lifetime in the organization. The analytical CRM can be a good background for the data mining techniques. Figure 2 shows the cycle of the CRM. It shows how to understand the customer via customer’s behavior analysis. Data mining techniques can be used in this section by CRM, deal to the rules and patterns of customer’s unknown behavior (Ebrahimi and Farzad, 2010).

CONCLUSION

Today, increasing access to information and recent changes in supply and demand process has shifted the power from suppliers to customers. Consequently, prominence can be achieved through understanding customer's needs and making personal interaction with customers. Nowadays, organizations try to implement the CRM systems to decrease their weakness in communication with customers. To select an appropriate technology for the CRM, organizations must identify various applications and software's which are related to data mining. The key of success in CRM is having an effective strategy to manage the data of data warehouse and also have necessary capabilities to analysis customer’s interaction data with business. Data mining can help the companies to move toward customer oriented methods. Using data mining organizations can identify the customer's data patterns. So, it enables the business owners to better offer of their services and products. Generally, integration of CRM and Data Mining can provide an effective response to customer’s needs; improve the quality of the products and services and ultimately rapid response to environmental changes.

REFERENCES


