Analytical Competition for Managing Customer Relations

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INTRODUCTION

With the advent of technology, information is available in abundance on the World Wide Web. In order to have appropriate and useful information users must increasingly use techniques and automated tools to search, extract, filter, analyze and evaluate desired information and resources. Data mining can be defined as the extraction of implicit, previously unknown, and potentially useful information from large databases.

On the other hand, text mining is the process of extracting the information from an unstructured text. A standard text mining approach will involve categorization of text, text clustering, and extraction of concepts, granular taxonomies production, sentiment analysis, document summarization, and modeling (Fan et al, 2006). Furthermore, Web mining is the discovery and analysis of useful information using the World Wide Web (Berry, 2002; Mobasher, 2007). This broad definition encompasses "web content mining," the automated search for resources and retrieval of information from millions of websites and online databases, as well as "web usage mining," the discovery and analysis of users' website navigation and online service access patterns.

Companies are investing significant amounts of time and money on creating, developing, and enhancing individualized customer relationship, a process called customer relationship management or CRM. Based on a report by the Aberdeen Group, worldwide CRM spending reached close to $20 billion by 2006. Today, to improve the customer relationship, most companies collect and refine massive amounts of data available through the customers. To increase the value of current information resources, data mining techniques can be rapidly implemented on existing software and hardware platforms, and integrated with new products and systems (Wang et al., 2008). If implemented on high-performance client/server or parallel processing computers, data mining tools can analyze enormous databases to answer customer-centric questions such as, "Which clients have the highest likelihood of responding to my next promotional mailing, and why." This paper provides a basic introduction to data mining and other related technologies and their applications in CRM.

BACKGROUND

Customer Relationship Management

Customer relationship management (CRM) is an enterprise approach to customer service that uses meaningful communication to understand and influence consumer behavior. The purpose of the process is two-fold: 1) to impact all aspects to the consumer relationship (e.g., improve customer satisfaction, enhance customer loyalty, and increase profitability) and 2) to ensure that employees within an organization are using CRM tools. The need for greater profitability requires an organization to proactively pursue its relationships with customers (Gao et al., 2007). In the corporate world, acquiring, building, and retaining customers are becoming top priorities. For many firms, the quality of its customer relationships provides its competitive edge over other businesses. In addition, the definition of "customer" has been expanded to include immediate consumers, partners and resellers—in other words, virtually everyone who participates, provides information, or requires services from the firm.

Companies worldwide are beginning to realize that surviving an intensively competitive and global marketplace requires closer relationships with customers. In turn, enhanced customer relationships can boost profitability three ways: 1) reducing cots by attracting more suitable customers; 2) generating profits through cross-selling and up-selling activities; and 3) extending profits through customer retention. Slightly expanded explanations of these activities follow.

- **Attracting more suitable customers:** Data mining can help firms understand which customers are most likely to purchase specific products and services, thus enabling businesses to develop targeted marketing programs for higher response rates and better returns on investment.
- **Better cross-selling and up-selling:** Businesses can increase their value proposition by offering additional products and services that are actually desired by customers, thereby raising satisfaction levels and reinforcing purchasing habits.
- **Better retention:** Data mining techniques can identify which customers are more likely to defect and why. This information can be used by a company to generate ideas that allow them maintain these customers.

In general, CRM promises higher returns on investments for businesses by enhancing customer-oriented processes such as sales, marketing, and customer service. Data mining helps companies build personal and profitable customer relationships by identifying and anticipating customer's needs throughout the customer lifecycle.

Data Mining: An Overview

Data mining can help reduce information overload and improve decision making. This is achieved by extracting and refining useful knowledge through a process of searching for relationships and patterns from the extensive data collected by organizations. The extracted information is used to predict, classify, model, and summarize the data being mined. Data mining technologies, such as rule induction, neural networks, genetic algorithms, fuzzy logic and rough sets, are used for classification and pattern recognition in many industries.

Data mining builds models of customer behavior using established statistical and machine learning techniques. The basic objective is to construct a model for one situation in which the answer or output is known, and then apply that model to another situation in which the answer or output is sought. The best applications of the above techniques are integrated with data warehouses and other interactive, flexible business analysis tools. The analytic data warehouse can thus improve business processes across the organization, in areas such as campaign management, new product rollout,

and fraud detection. Data mining integrates different technologies to populate, organize, and manage the data store. Since quality data is crucial to accurate results, data mining tools must be able to "clean" the data, making it consistent, uniform, and compatible with the data store. Data mining employs several techniques to extract important information. Operations are the actions that can be performed on accumulated data, including predictive modeling, database segmentation, link analysis, and deviation detection.

Statistical procedures can be used to apply advanced data mining techniques to modeling (Yang & Zhu, 2002; Huang et al., 2006). Improvements in user interfaces and automation techniques make advanced analysis more feasible. There are two groups of modeling and associated tools: theory-driven and data driven. The purpose of theory-driven modeling, also called hypothesis testing, is to substantiate or disprove a priori notions. Thus, theory-driven modeling tools ask the user to specify the model and then test its validity. On the other hand, data-driven modeling tools generate the model automatically based on discovered patterns in the data. The resulting model must be tested and validated prior to acceptance. Since modeling is an evolving and complex process, the final model might require a combination of prior knowledge and new information, yielding a competitive advantage (Davenport & Harris, 2007).

MAIN THRUST

Modern data mining can take advantage of increasing computing power and high-powered analytical techniques to reveal useful relationships in large databases (Han & Kamber, 2006; Wang et al., 2007). For example, in a database containing hundreds of thousands of customers, a data mining process can process separate pieces of information and uncover that 73% of all people who purchased sport utility vehicles also bought outdoor recreation equipment such as boats and snowmobiles within three years of purchasing their SUVs. This kind of information is invaluable to recreation equipment manufacturers. Furthermore, data mining can identify potential customers and facilitate targeted marketing.

CRM software applications can help database marketers automate the process of interacting with their customers (Kracklauer et al., 2004). First, data-

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