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ANALYZING DATA MINING TECHNIQUES FOR BETTER CUSTOMER RELATIONSHIP MANAGEMENT

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Abstract

In the field of CRM, data mining is turning from specialized technology into mainstream practice. Analytical CRM has proven to be the killer application for data mining; probably the most important challenge for unleashing the power of data mining technology is seamless integration with business processes. It might be interesting to predict customer behavior, but only when one manages to act upon these insights does this knowledge become commercially relevant. Prediction and analysis is important, but only deployment will make this useful.
The main goal of the paper is to illustrate the importance of the optimization methods used in data mining process, as well as the specific predictive models and how they work in this field. Also, the customer relationship management systems have been developed lately, offering new opportunities for a strong profitable relation between a business and clients.

Key words: - data mining, data warehouses, attribute selection, optimization algorithms, preprocessing, clustering, classification, association, customer relationship management, OLAP

1. Introduction

Data mining techniques are the processes designed to identify and interpret data for the purpose of understanding and deducing actionable trends and designing strategies based on those trends. Data mining techniques extract the raw data, and then transform them to get the transformed data, and then get meaningful patterns among the transformed data.

The process of data mining involves multiple steps (see fig. 2). It starts with the selection of data incorporated in a training set that consists of observed values of certain attributes, generally historical data. The selected data are then cleaned and preprocessed. Cleaning is made in order to remove the discrepancies and preprocessing is responsible for consolidation of relevant information to the mining algorithm, trying to reduce the problem complexity.
As businesses evaluate their investments on marketing activities, they tend to focus on their data mining techniques and capability. How to learn more about customers and their inclination towards particular products, use that information to make appropriate choices to customers, and understand which marketing strategies can succeed in long term customer satisfaction and retention.

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Managers can understand their customer by evaluating customer behavior, customer segregation, customer profiles, loyalty (how long have they been associated with the company) and profitability (which products can be targeted to the particular customer so as to extract maximum profits). Data Mining helps managers to identify valuable patterns contained in raw data and their relations so as to help the major decisions.
The basic structure of CRM model lifecycle is shown in figure 1. The model can have two initiating pts. Firstly, the customer does some purchase and then the data is measured and evaluated. Afterwards, the company mines the evaluated data and then they can have an understanding of the patterns that the customer shows while purchasing. With the help of that data, the organization can formulate its steps to maximize or optimize its business plans. Secondly, the organization takes some action for improving the customer's satisfaction by making a good informative offer, and then studies the actions taken by the customer. Then the actions of the customer are again evaluated and an understanding of the customer is achieved.

Customer Relationship Management (CRM) business strategy focused on maximizing customer value by winning, growing and keeping the right customers. In practical terms however, adopting a CRM centric model generally means arranging business processes around customer needs - as an alternative to arranging processes to suit a preferred organizational structure. Data mining uses well- established statistical technique and machine learning techniques to build models that predict customer behavior.

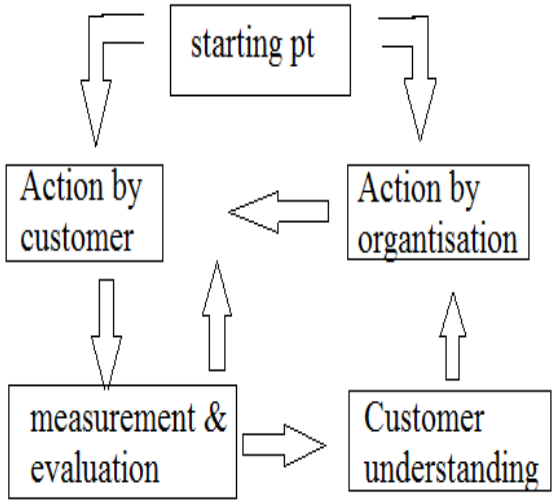


Figure1. The basic CRM cycle .

In the field of CRM, data mining is turning from specialized technology into mainstream practice.

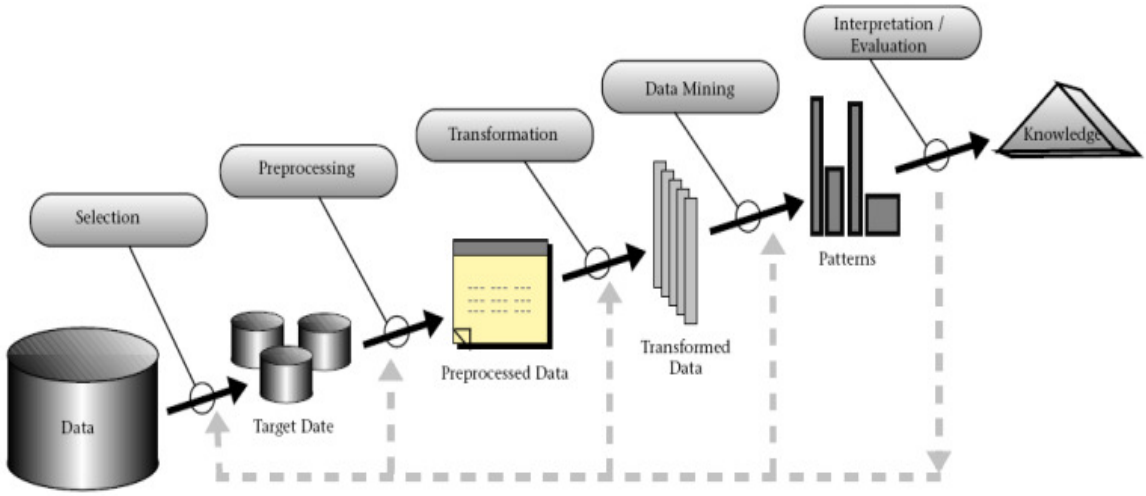
2. Data Mining Techniques For Better Customer Relationship Management

A customer relationship management system (CRM) is a bucket of IT applications and procedures whose target is to identify the main expectations and preferences of the clients and to use efficiently the gathered information in order to improve the relationships between

the business and the customers. The implementation of such system implies two components:

- The managerial component, consisted of the total methods and techniques used for the integration and usage of data related to the customers behaviour;
- The IT component, which includes the hardware and software equipment used for data collection, storing and management.

The main components of CRM systems are:



A stop shop is the input point in the system for the data, meaning the requests and claims of the clients, which then are processed within a documents management system process;
Contact Center/ Help Desk offers special assistance to the clients who ask for information regarding the specific products and services. Developing such a component provides many advantages: reducing the number of missed calls by intelligent distribution of calls, increasing the productivity of the marketing and sales departments, enhancing customer satisfaction by increasing the value that he perceives, monitoring the satisfaction of customers.
eCRM meaning the internet technology using specific instruments, such as: personalized e-mail addresses, chat or interactive dialogs, forums.

According to [3], CRM consists of four dimensions: (1) Customer Identification; (2) Customer Attraction; (3) Customer Retention; (4) Customer development.
They share the common goal of creating a deeper understanding of customers to maximize customer value to the organization in the long term. Data mining techniques, therefore, can help to accomplish such a goal by extracting or detecting hidden customer characteristics and behaviours from large databases.
The main advantages of CRM implementation are: more efficient activities of the orders received from consumers, improving the quality of services provided to the clients, a qualitatively higher level communication with the client by using multiple communication channels (telephone, stop shop, web, e-mail), reducing the communication costs with clients, reduce time consuming for claims, achieving a better image of the organization in front of clients.

In practice, especially in the large companies, applying CRM techniques implies the following steps:

1. Identify the organization's clients and including them in different categories depending on their preferences and behaviors. We can split the clients in four categories:

a) Clients with general requirements and an uniform character;

b) Clients with specific requirements and an uniform character;

c) Clients with general requirements and no uniform character;

d) Clients with specific requirements and no uniform character

2. Establishing the necessary information and design the system architecture. In this phase, there is planning the clients management database which includes, in general, information related to: identification of person, professional training, social status, membership in a particular category of clients, attitudes and perceptions, behaviors in different situations, requests, complaints submitted by customer.

3. Identifying ways of information gathering which involves developing a toolbox of methods and techniques whereby information describing customer behaviors to be collected and entered into the database.

4. Gathering information and updating the database that consists of applying the techniques defined in the second stage, with the scope of the consolidation of customer database.

5. Making operational the changes in the organizational plan for enhancing the customer satisfaction by improving and diversifying provided services, acting simultaneously both in terms of coverage general requirements and individual ones. Studies reveal that the amplification of satisfaction degree generates an improved image of the organization on the market, but only up to a maximum point, beyond which the image begins to deteriorate.

Data mining plays an important role in CRM by identifyingcustomer behavior patterns from customer usage data and predicting which customers are likely to respond to cross-sell and up-sell campaigns, which is very important to the business [4]. Regarding former customers, data mining can be used to analyze the reasons for churns and to predict churn [5].

Optimization also plays an important role in CRM and in particular in determining how to develop proactive customer interaction strategy to maximize customer lifetime value. A customer is profitable if the revenue from this customer exceeds company's cost to attract, sell and service this customer. This excess is called the customer lifetime value [6].

E.W.T. Ngai in [7] proposes a graphical classification framework on data mining techniques in CRM as shown in figure 3.

Data mining techniques can be used successfully, especially because CRM implies a multidimensional approach which can, by instance, include three dimensions:

- Hierarchy of products (brand, class, category, product);
- Hierarchy of periods (years, quarters, months, dates);
- Customer hierarchy (regions, areas class customers).

In practice, this approach is successfully performed through a modern concept that stands today in the majority of process support systems decision, namely the OLAP (On-Line Analytic Processing), which is based on technical multidimensional data analysis [9], [10].

If we refer to the CRM user demands, OLAP systems provide support for real-time satisfaction of specific claims, because they anticipate the timing and content of the interrogation and provides the optimal combination between pre-calculated results and those calculated at the time of information requested. OLAP systems use a specific tool, reason for which most experts believe that they represent the best environment for implementation of functional information models based on systems dynamic

principles.

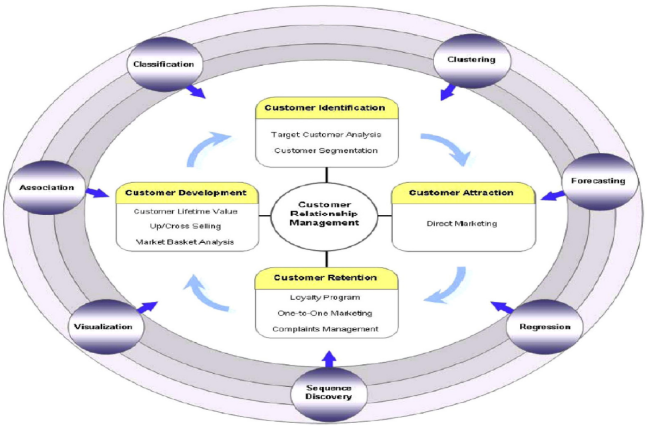


Figure 3 - Classification framework for data mining techniques in CRM

At present, almost all large organizations hold an Intranet platform which, together with some extensions and instruments, provides the basic functionality of Business Intelligence applications, such as organizing information in data warehouses and processing them using data mining techniques. Numerous specific data mining functions are already implemented as components of the Intranet architecture or like specific solutions such as CRM.

3. Conclusions

The large volume of information that decision makers are facing, requires advanced processing technologies, but also new types of systems to assist decision. Business Intelligence is currently offering solution for the problems in decision making at all managerial levels.

Data Mining, as part of BI systems, has enjoyed great popularity in recent years, with advances in both research and commercialization. Data mining is focused on assessing the predictive power of models and performs analysis that would be too hard- working and time-consuming by using traditional statistical methods. It offers important information which is used to improve customer retention, response rates, attraction, and cross selling. As shown in the paper, through the full implementation of a CRM program, the companies increase the value of their customers, keeping and attracting the right ones.

Although many books and articles have been written on Business Intelligence topic, it still represents a promising research field. Interest in data mining continues to increase and the potential of using optimization methods needs more study. Also, investigating how to combine optimization and data mining techniques, especially in the CRM area, should be encouraged for many reasons. Data mining and optimization can be integrated to build customer profiles, which is absolutely necessary in many CRM applications.

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