

A Data mining model for Customer Relationship Management -A Review

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Abstract— Data Mining is an analytic process designed to explore data in search of consistent patterns and/or systematic relationships between variables, and then to validate the findings by applying the detected patterns to new subsets of data. Data mining is challenging area and its possible applications in business provides an emerging research topic. It is about analyzing data patterns to extract knowledge for optimizing the customer relationships.

Index Terms—Automated data mining model, business, customer relationship management, data mining.

I. INTRODUCTION

Data Mining is an analytic process designed to explore data in search of consistent patterns and/or systematic relationships between variables, and then to validate the findings by applying the detected patterns to new subsets of data. Data mining as an emerging area and its possible applications in business provides a challenging research topic. Data mining aims to extract knowledge and insight through the analysis of large amounts of data using sophisticated modeling techniques.

II. LITERATURE REVIEW

Data mining is the analysis step of knowledge discovery in databases process. It converts data into knowledge and actionable information (Tsipstis & Antonios). Through the use of automated data mining techniques, businesses are discovering new trends and patterns of behavior that previously went unnoticed. For example data mining can be used to identify customers with a greater likelihood of responding to an offer and possibly send communication to selected customers. Data mining tools addresses business questions which in the past were too time-consuming to pursue. Data mining represents the link from the data stored over many years through various interactions with customers in diverse situations, and the knowledge necessary to be successful in relationship marketing concepts. It involves the use of data mining models in order to assess the value of the customers, understand, and predict their behavior. It is about analyzing data patterns to extract knowledge for optimizing the customer relationships.

In this research I propose to undertake an exhaustive study to build an automated data mining model which can be used for effective business decision making especially for customer relationship management (CRM). The way in which companies interact with their customers

has changed dramatically over the past few years. A customer's continuing business is no longer guaranteed. As a result, companies have found that they need to understand their customers better, and to quickly respond to their wants and needs. In addition, the time frame in which these responses need to be made has been shrinking. It is no longer possible to wait until the signs of customer dissatisfaction are obvious before action must be taken. To succeed, companies must be proactive and anticipate what a customer desires.

The key focus areas will be examining time based patterns which help business in making stocking decisions, developing profiles of customers with certain behaviors, identifying items which are purchased together and identifying customers who are brand loyal. This will be done by conducting an extensive literature survey on latest data mining techniques, study of different models, data collection from leading business firms and integrating the same to form a reliable model.

There will be four major steps in carrying out the data mining activity.

1) Gathering Data – The first step towards developing a data mining model is collection of useful data. Data preparation and cleaning is an often neglected but extremely important step in the data mining process. The important factor is identifying data critical to the business, refine it and prepare it for data mining process. This stage usually starts with data preparation which may involve cleaning data, data transformations, selecting subsets of records and - in case of data sets with large numbers of variables, performing some preliminary feature election operations to bring the number of variables to a manageable range.

2) Selecting an algorithm – The next step is to choose one or more algorithms in data mining to apply to the problem in hand. One of the preliminary stage in predictive data mining, when the data set includes more variables than could be included in the actual model building phase, is to select predictors from a large list of candidates. For example, when data are collected via automated (computerized) methods, it is not uncommon that measurements are recorded for thousands or hundreds of thousands of predictors. The standard analytic methods for predictive data mining, such as neural network analyses, classification and regression

trees, generalized linear models, or general linear models become impractical when the number of predictors exceed more than a few hundred variables.

3) Automating the data mining process – A user interface is to be developed and the algorithm need to be coded so as to facilitate easy retrieval of information. This is done by setting up a predetermined analysis methodology. An algorithm is developed that attempts to replicate the step by step decision making process that a trained modeler would follow. At each step in the process, preset criteria are used to select analysis options.

4) Validation of model & Deployment - The final stage involves using the model selected as best in the previous stage and applying it to the new data in order to generate predictions or estimates of the expected outcome. Validation is concerned with building the right model. It is utilized to determine that a model is an accurate representation of the real system. Validation is usually achieved through the calibration of the model, an iterative process of comparing the model to actual system behavior and using the discrepancies between the two, and the insights gained, to improve the model. This process is repeated until model accuracy is judged to be acceptable. Measures of data mining generally fall into the categories of accuracy, reliability, and usefulness. Accuracy is a measure of how well the model correlates an outcome with the attributes in the data that has been provided. Reliability assesses the way that a data mining model performs on different data sets. Usefulness includes various metrics that tell you whether the model provides useful information.

Customer development [1,8]. Some of the areas in which data mining can be applied includes Sales and marketing, Customer retention, Inventory, fraud detection etc.

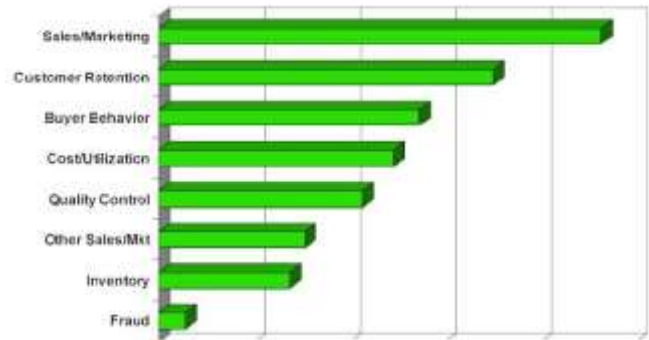


Figure 2: Application areas of data mining
The basic components in the model of CRM includes figure 3 [2]:

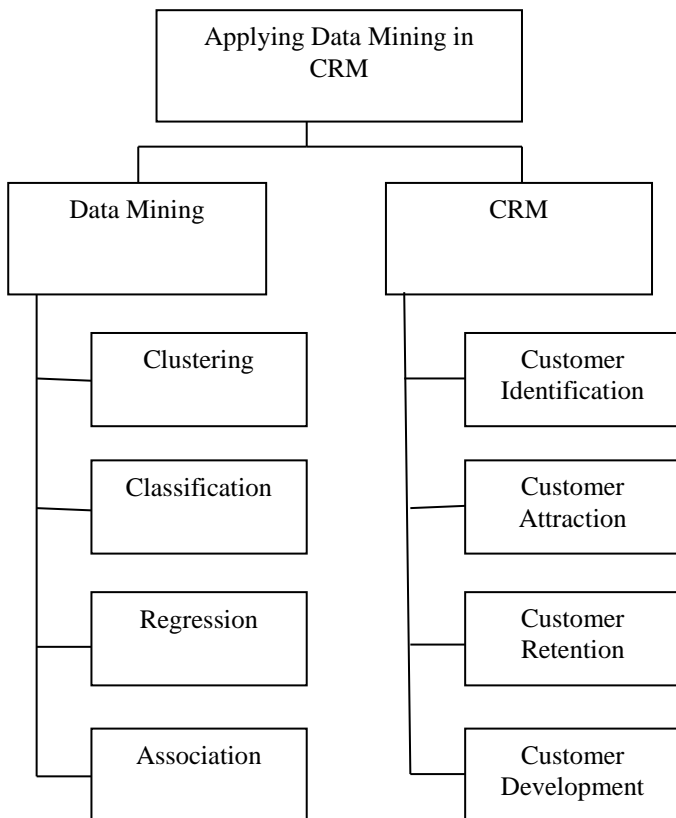


Figure:1 CRM dimensions in Data Mining

As in the above figure CRM dimensions include Customer identification, Customer attraction, Customer retention and

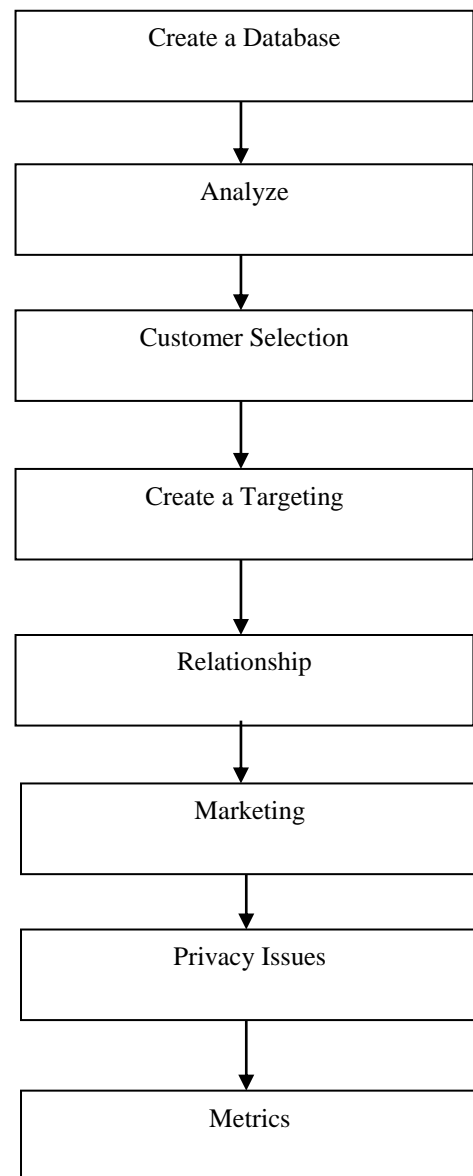


Figure 3:Components of CRM Model

CRM can be viewed as a customer centric initiative that regards customer lifecycle as an important business asset and aims to retain customers and enrich the customer

satisfaction [7]. Customer Relationship Management helps in building long term and profitable relationships with valuable customers [5]. CRM includes all the steps which an organization employs to create and establish beneficial relationships with the customers. 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. It is possible to improve CRM efficiency, to have an effective and rapid response to customer needs, by integrating CRM and data mining techniques[12].

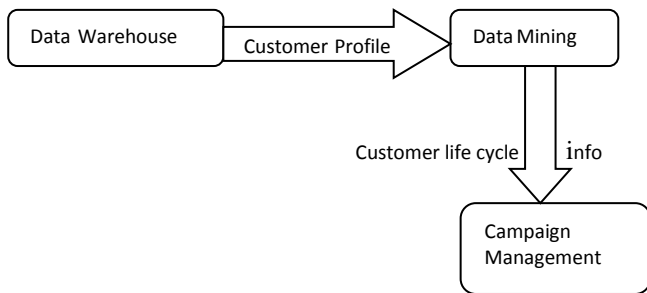


Figure 4: Data Mining in CRM

As in figure 4 from the data warehouse customer profile is passed through data mining and customer life cycle information leads to campaign management. By applying data mining we can increase customer revenue and customer profitability

III. FUTURE RESEARCH

A discovery and predictive modeling algorithm is proposed to be developed and automated which will be applied on internal data like billing details, survey, web logs etc. Prior to this internal data need to be converted in to a structure format which facilitates knowledge extraction. The expected output is a score for a particular transaction, customer or decision and recommended action based on the score. The performance of the model is to be validated using the data from real world business environment.

IV. CONCLUSION

Data Mining has important applications in Customer Relationship Management. Customer Relationship Management (CRM) Is the methods and tools that help businesses manage relationships between customers in an structured manner. Customer Relationship Management has an important role in today's world. The more effectiveness of using the information of the customers to meet their needs is directly proportional to the profit you will get. CRM considers "Customer as the King" in a business.

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