

Application of Data Mining techniques for Customer Relationship Management (CRM)

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Abstract

Consumers make choices about where to shop based on their preferences for a shopping environment and experience as well as the selection of products at a particular store. Advancements in technology have made relationship marketing a reality in recent years. Technologies such as data warehousing, data mining, and campaign management software have made customer relationship management a new area where firms can gain a competitive advantage. Particularly through data mining the extraction of hidden predictive information from large databases organizations can identify valuable customers, predict future behaviors, and enable firms to make proactive, knowledge-driven decisions.

Data mining tools answer business questions that in the past were too time-consuming to pursue. Yet, it is the answers to these questions make customer relationship management possible. While differing approaches abound in the realm of Data mining, the use of some type of data mining is necessary to accomplish the goals of today's customer relationship management philosophy.

Keywords: Data Mining Search Engine, Customer Relationship Management, Marketing Techniques, Data mining, Decision Making

Introduction:

A new business culture is developing today. Within it, the economics of customer relationships are changing in fundamental ways, and companies are facing the need to implement new solutions and strategies that address these changes. The concepts of mass production and mass marketing, first

created during the [1] Industrial Revolution, are being supplanted by new ideas in which customer relationships are the central business issue. Firms today are concerned with increasing customer value through analysis of the customer lifecycle. The tools and technologies of data

warehousing, data mining, and other customer relationship management (CRM) [2] techniques afford new opportunities for businesses to act on the concepts of relationship marketing. The old model of “design-build-sell”(a product-oriented view) is being replaced by “sell-build-redesign”(a customer-oriented view). The traditional process of mass marketing is being challenged by the new approach of [3] one-to-one marketing. In the traditional process, the marketing goal is to reach more customers and expand the customer base. But given the high cost of acquiring new customers, it makes better sense to conduct business with current customers.[4] In so doing, the marketing focus shifts away from the breadth of customer base to the depth of each customer’s needs. Consumers make choices about where to shop based on their preferences for a shopping environment and experience as well as the selection of products at a particular store and distance to travel.

They select a store that gives them the best combination of prices, convenience, variety and service, and time and distance to travel to the store, subject to their time and money constraints. The performance metric

changes from market share to so-called “wallet share”. [5] Businesses do not just deal with customers in order to make transactions; they turn the opportunity to sell products into a service experience and endeavor to establish a Long-term relationship with each customer. The advent of the Internet has undoubtedly contributed to the shift of marketing focus.

As on-line information become more accessible and abundant, consumers become more informed and sophisticated. [7][9] They are aware of all that is being offered, and they demand the best. To cope with this condition, businesses have to distinguish their products or services in a way that avoids the undesired result of becoming mere commodities.

One effective way to distinguish themselves is with systems that can interact precisely and consistently with customers. Collecting customer demographics and behavior data makes precision targeting possible. This kind of targeting also helps when devising an effective promotion plan to meet tough competition or identifying prospective customers when new products appear. Interacting [10] with customers consistently means businesses must store transaction records and

responses in an online system that is available to knowledgeable staff members who know how to interact with it. The importance of establishing close customer relationships is recognized, and CRM is called for. It may seem that CRM is applicable only for managing relationships between businesses and consumers. A [11] closer examination reveals that it is even more crucial for business customers. In business-to-business environments, a tremendous amount of information is exchanged on a regular basis.

For example, transactions are more numerous, custom contracts are more diverse, and pricing schemes are more complicated. CRM helps smooth the process when various representatives of seller and buyer companies communicate and collaborate. Customized catalogues, personalized business portals, and targeted product offers can simplify the procurement process and improve efficiencies for both companies. E-mail alerts and new product information tailored to different roles in the buyer company can help increase the effectiveness of the sales pitch. Trust and authority are enhanced if targeted academic reports or industry news are delivered to the relevant individuals.[8] All of these

can be considered among the benefits of CRM. Business processes organize around the customer life cycle as shown in the figure (i). Customer satisfaction provides bottom-line business results in the form of increased purchased volumes, repetitive purchases, and generation of new business in the form of references and prospect identification.

Activities a business performs to identify, qualify, acquire, develop and retain increasingly loyal and profitable customers by delivering the right product or service, to the right customer, through the right channel, at the right time and the right cost [12]. CRM is, essentially, a business strategy that aims to help companies maximize customer profitability from streamlined, integrated customer-facing processes [4]. The motivation for companies to manage their customer relationships is to increase profitability from concentrating on the economically valuable customers, increasing revenue (“share of wallet”) from them, while possibly “demarketing” and discontinuing the business relationship with invaluable customers [5]. CRM systems are regarded as “front office” systems since they are concerned with the

relationship of the organization with its sources of revenue [6].

Business Processes organize around the customer life cycle as shown in the figure below.(Figure i)

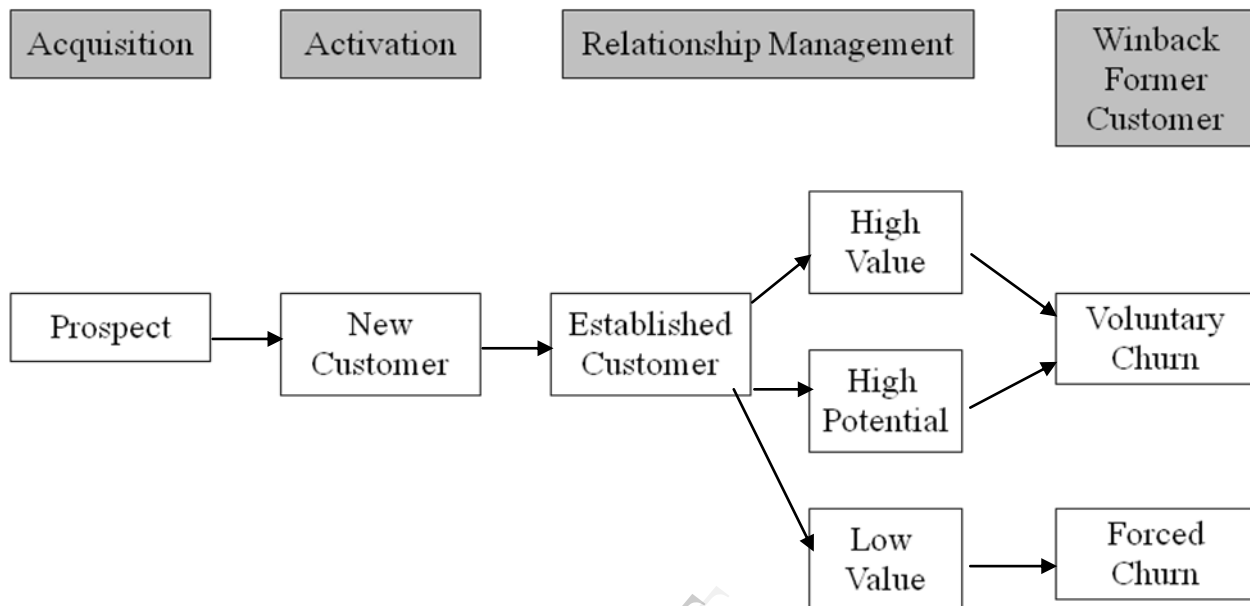


Figure i) Different events in customer's Life cycle

Data mining: An overview

Data Mining and Knowledge Discovery in Databases (KDD) “Data mining is the exploration and analysis, by automatic or semiautomatic means, of large quantities of data in order to discover meaningful patterns and rules.” [4] While there are many other accepted definitions of data mining, this one captures the notion that data miners are searching for meaningful patterns in large quantities of data. The implied goal of such an effort is the use of these meaningful patterns

to improve business practices including marketing, sales, and customer management. Historically the finding of useful patterns in data has been referred to as knowledge extraction, information discovery, information harvesting, data archeology, and data pattern processing in addition to data mining. In recent years the field has settled on data mining to describe these activities. [9] Statisticians have commonly used the term data mining to refer to the patterns in data that are

discovered through multivariate regression analyses and other statistical techniques. As the evolution of data mining has matured, it is widely accepted to be a single phase in a larger life cycle known as Knowledge Discovery in Databases or KDD for short. The term KDD was coined in 1989 to refer to the broad process of finding knowledge in data stores. [10] The field of KDD is particularly focused on the activities leading up to the actual data analysis and including the evaluation and deployment of results. KDD nominally encompasses the following activities (see Figure ii):

- 1) **Data Selection:** The goal of this phase is the extraction from a larger data store of only the data that is relevant to the data mining analysis. This data extraction helps to streamline and speed up the process.
- 2) **Data Preprocessing:** This phase of KDD is concerned with data cleansing and preparation tasks that are necessary to ensure correct results. Eliminating missing values in the data, ensuring that coded values have a uniform meaning and ensuring that no spurious data values exist are typical actions that occur during this phase.
- 3) **Data Transformation:** This phase of the lifecycle is aimed at

converting the data into a two-dimensional table and eliminating unwanted or highly correlated fields so the results are valid.

- 4) **Data Mining:** The goal of the data mining phase is to analyze the data by an appropriate set of algorithms in order to discover meaningful patterns and rules and produce predictive models. This is the core element of the KDD cycle.
- 5) **Interpretation and Evaluation:** While data mining algorithms have the potential to produce an unlimited number of patterns hidden in the data, many of these may not be meaningful or useful. This final phase is aimed at selecting those models that are valid and useful for making future business decisions. The result of this process is newly acquired knowledge formerly hidden in the data. This new knowledge may then be used to assist in future Decision making process.

The evolution of data mining: Data mining techniques are the result of a long research and product development process. The origin of data mining lies with the first storage of data on computers continues with improvements in data access, until today technology allows users to navigate through data in real time.

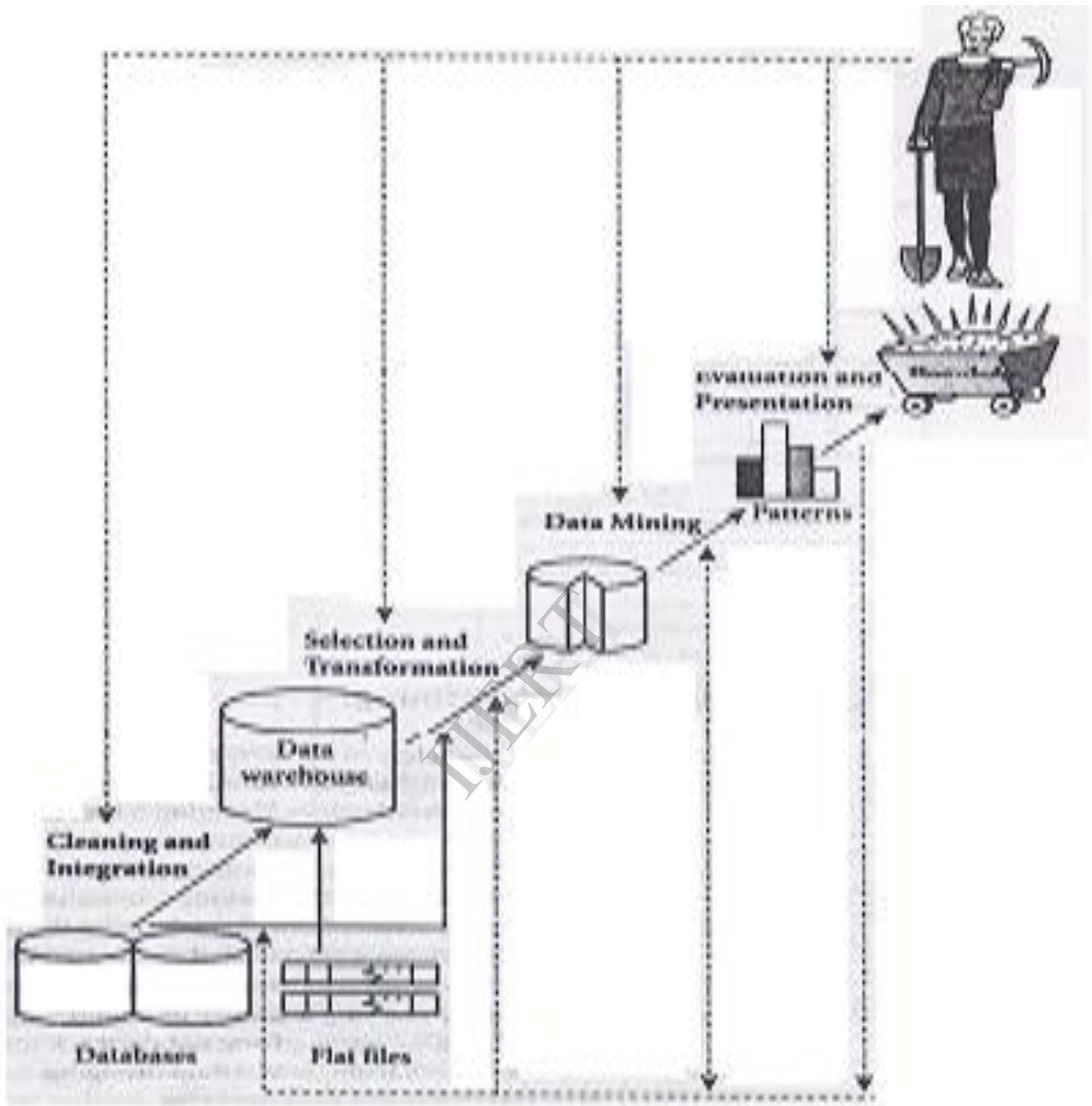


Figure ii) The Traditional KDD Paradigm.

Model for Customer Relationship:

Management (CRM) with Data Mining Engine (DME)-The

methodology presented in this paper, combines the CRM and Data Mining

techniques. The main steps of the methodology are described below (Fig. iii) Customer Relationship

management (CRM) - Data Mining Engine (DME) Model Flow chart.

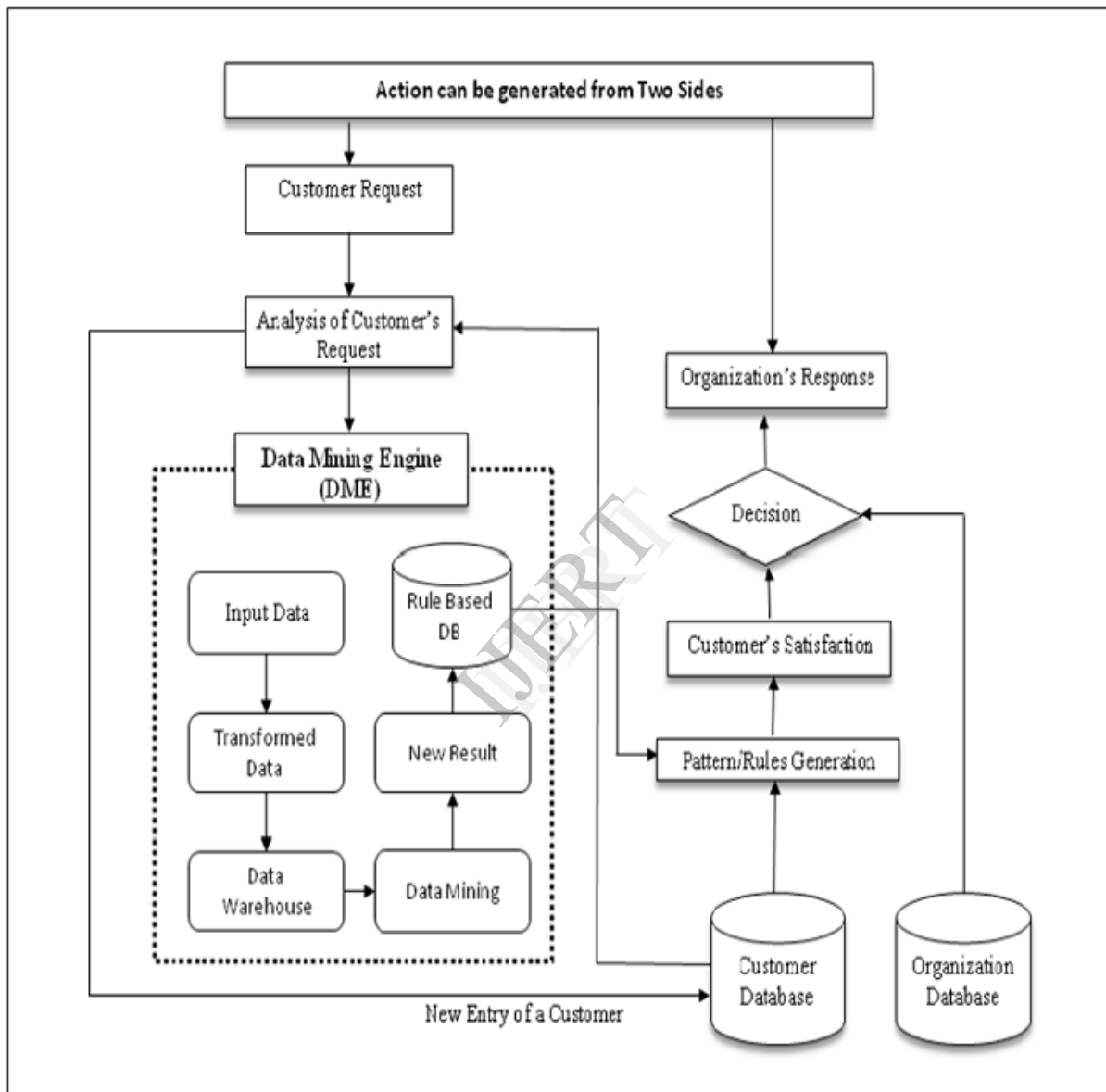


Figure iii) CRM-DME Model

i) Customer Request:

This is not always obvious since there are many actors involved in the

purchase and use of a certain product or service. Yet five main roles can be identified that exist in many purchasing situations [11]. Most of

the time all of the five roles are submitting their queries. Customer can be a user, purchaser, influencer or seller, so there are several individuals available to work on that particular query.[12]

ii) Analysis of Customer's Request:

Having different kinds of queries needs to be analyze before forwarding to a particular department. Queries can be raise in the form of suggestions, [13] requisitions, questionnaires, sales inquiries, or reclamations. In this step, we analyzed the query, if the queried person is new then the record will first forwarded to the customer database for update the record.

iii) Data Mining Engine (DME):

Ultimately all the data related to the particular organization is saved in the database, we have to execute and process this huge data in an efficient manner. Auspiciously, data mining is the technique to extract information from the databases. [14] To assure our model to be best, we presented Data Mining Engine (DME). Every time when a query dispatched to the appropriate department, the reply will be provided to the questioner with the help of database (mined data), and finally this all correspondence will

keep in access for the future aspects. In the DME the we took query analysis as an input, for the implementation of Association mining we transformed the data in an appropriate form i.e. column and rows, or comma delimited. Apriori algorithm or clustering can be applied on the transformed data for [15] generation of the new rules and patterns. Then algorithm applied result will be saved in rule based database for further work.

This process is not required for all the queries, only new entry will go through to this process, traditional or old queries will solve by the previous example, which is also the major quality of DME.

iv) Patterns/Rules Generation:

As a result from DME in connection with the customer database we can generate rules or pattern by experiencing the customer's query. The rules can be sales plan, new strategies for the marketing department, annual sales prediction [16] budget for the New Year or employees salaries and benefits. This will support the organization in an effective manner that some policies and rules will be automatically created and publicized by using DME [17].

v) Customer's Satisfaction:

By applying data mining techniques we can discover customer behavior, customer satisfaction, and loyalty or background of the customer. Assessment and analysis in this model may strengthen customer behavior and loyalty for particular organization. Using data mining techniques the organization can take positive from which the customer would be satisfied [18] under the company's policy and limitations.

vi) Organization's Response:

After having complete analysis and evaluation organization's action may be included for positive response regarding [19] [22] particular customer query, prediction for sale escalation, some new marketing plan, and new strategies for advertisement and instructions for their respected employees.

Future Work: The model presented in this paper will be updated through the customer survey or questionnaire. This will enhance our model for customer relationship management (CRM) [5]. We can improve our model structure by surveying customers and generating new rules [21] and patterns that will give some fruit full results to

the company. By using different data mining methodologies [23] and some more statistical analysis the model can lead to more enhanced.

Conclusion:

The obtainable model is not providing only economical support to the company but it also establishing the long live relations between the client and a company. We use Data Mining Engine (DME) in this representation for new generating rules and patterns. Good relation with the customer means lot of wide space available for a corporation to work with more enthusiastically. [24] This approach is specially giving new techniques to understand and convince the customer.

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