“A Comprehensive Study of CRM through Data Mining Techniques”

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ABSTRACT

In today’s competitive scenario in corporate world, “Customer Retention” strategy in Customer Relationship Management (CRM) is an increasingly pressed issue. Data mining techniques play a vital role in better CRM. This paper attempts to bring a new perspective by focusing the issue of data mining applications, opportunities and challenges in CRM. It covers the topic such as customer retention, customer services, risk assessment, fraud detection and some of the data mining tools which are widely used in CRM.
INTRODUCTION
Customer Relationship Management (CRM)

• The emergence of Information Technology and use of computer in every field of activities has created a new buzz in the field of marketing and that is the concept of Consumer Relationship Management (CRM).

• The concept of CRM defined as “the process of acquiring, retaining and growing profitable customer which requires a clear focus on service attributes that represent value to the customer and creates loyalty”.

• The CRM is a term applied to processes implemented by company to handle their contact with their customers. CRM software is used to support these processes, storing information about prospective customers.
…Customer Relationship Management (CRM)

• The term CRM is generally used to refer to software based approach for handling customer relationship.

• Most CRM software vendors stress that a successful CRM strategy require a holistic approach.

• CRM initiative often fails because implementation was limited to software installation without providing the appropriate motivation for employees to learn, provide inputs and take full advantage of the information system.

• The customer relationship is neither a concept nor a project, instead a business strategy that aims to understand, anticipate and manage the needs of an organization’s current and potential customer.
Customer Relationship Management (CRM)

The CRM includes many-aspects which relate to one another:

- **Front office operations**: Direct interaction with customer, e.g. face to face, email, online services, phone calls etc.

- **Back office operations**: Operations that ultimately affect the activities of the front office e.g. billing, maintenance, marketing, planning, finance, manufacturing, advertising, etc.

- **Business Relationship**: Interaction with other companies & partners, such as suppliers/vendors and retail outlets, distributors, industry networks. This external network supports front and back office activities.

- **Analysis**: Key CRM data can be analyzed in order to plan target-marking campaigns, conceive business strategies, and judge the success of CRM activities.
Technological Consideration

The basic building blocks of CRM are:

- **Customer Databases**: A database for customer life cycle information about each customer & prospect and their interactions with the organization, including order information, support information, requests, complaints, interviews and survey responses.

- **Customer Intelligence**: Translation customer needs and profitability projection into game plans for different segments or groups of customers, captured by customer interactions into software that tracks whether that game plan is followed and whether the desired outcomes are obtained.
...Technological Consideration

• **Learning and Competency Management Systems:** Training & improving processes and technology that enable the organizations to get closer to achieving the desired results.

Complex system require practice in order to achieve desired outcomes, especially when human and technology are interacting. Iteration is the key to refining, improving and innovating to stay ahead of the competition in CRM.
Customer Life Cycle (CLC)

The customer life cycle has three stages:

(i) **Customer acquisition:** Customer acquisition is the major objective of all organization. Different organization provides services in order to increase their customer databases. Customer acquisition strategy focuses upon making the buyer perspective customer in future.

(ii) **Retaining good customers:** It is the process of keeping customer in the customer inventory for an unending period by meeting the needs and exceeding the expectations of those customers. Retaining customer is more important than attracting new customer. It enables a long term relationship of mutual benefits both to the organization and customer concerns.
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(iii) Making the relationship of customers: It is the process of acquiring, retaining, maintaining and growing profitable customers.

The aim of marketing is to meet and satisfy target customer needs and wants. The modern marketing concept makes customer the centre stage of organization effort the focus within their marketing concepts to reach the target customers. So customer is considered to be the king forever in all markets.
Scope of CRM

The scope of CRM in terms of point is as follows:

• Implementing appropriate systems to support customer knowledge acquisition, sharing and measuring CRM effectiveness.

• Integrating the activities of marketing, sales and service to achieve a common goal.

• Applying customer knowledge to continuously improve performance through a process of learning from successes and failures.
...Scope of CRM

• Acquiring and continuously updating knowledge about customer needs, motivations and behavior over the lifetime of the relationship.

• Measuring both inputs across all functions including marketing, sales and service costs and outputs in terms of customer revenue, profit and value.

• Constantly flexing the balance between marketing, sales and service inputs against changing customer needs to maximize profit.
Benefits of CRM

The benefits of CRM are:

- CRM permits business to leverage information from their databases to achieve customer retention and to cross sell new products.
- Companies that implement CRM make better relationships with their customers achieve loyal customers and a substantial payback increased revenues and reduced cost.
- CRM focus upon profitable client through efficient segmentation according to individual behavior.
- CRM results both in higher revenue and lower cost making companies more effective and efficient.
DATA MINING (DM)
Introduction to DM

• Data mining (DM) refers to extracting or “mining” knowledge from large amounts of data [11].

• DM is the science of finding new interesting patterns and relationship in huge amount of data.

• Data Mining is defined as “the process of discovering meaningful new correlations, patterns, and trends by digging into large amounts of data stored in warehouses”. It requires intelligent technologies and the willingness to explore the possibility of hidden knowledge that resides in the data. [4]
Data Mining Application Domains

• **Customer Retention**: Sophisticated customer-retention programs begin with modeling those customers who have defected to identify patterns that led to their defection. These models are then applied to the current customers to identify likely defectors so that preventive actions can be initiated.

• **Sales and Customer Services**: In today’s highly competitive environment, superior customer service creates the sales leaders. If customer information is available, rule-based software can be employed to automatically recommend products. The programs like market-basket analysis have already shown phenomenal gains in cross-selling ratios, floor and shelf layout and product placement improvements and better layout of catalog and web pages.
Data Mining Application Domains

- **Marketing:** Marketing depends heavily on accurate information to execute retention campaigns, lifetime value analysis, trending targeted promotions, etc. Only by having a complete customer profile can promotions be targeted and targeting dramatically increase response rates and thus decrease campaign cost.

- **Risk Assessment & Fraud Detection:** An accessible customer base significantly reduces the risk of entering into undo risk. For example, a bank can identify fiscally related companies that may be in financial jeopardy before extending a loan to them.
Data Mining Techniques for CRM

• Data mining techniques deal with discovery and learning. Data mining techniques may be helpful to accomplish the goal of CRM by extracting or detecting hidden customer characteristics and behaviours from large databases. Following are some of the popular data mining techniques:
  ➢ Association Rule Learning
  ➢ Classification & Prediction
  ➢ Clustering
  ➢ Regression Analysis
  ➢ Visualization
Association Rule Learning

- It is a popular method for discovering interesting relations between variables in large databases. Agrawal et al. [1,5] introduced association rules for discovering regularities between products in large scale transaction data recorded by point-of-sale (POS) systems in supermarkets. For example,

\[
\{\text{Computer, Monitor}\} \Rightarrow \{\text{U.P.S.}\}
\]

- The above association rule found in the sales data of a supermarket would indicate that if a customer buys computers and monitors together, he or she is likely to also buy a U.P.S.
Classification & Prediction

- Classification and prediction are two forms of data analysis that can be used to extract models describing important data classes or to predict future data trends. It aims at building a model to predict future customer behaviors through classifying databases records into a number of predefined classes based on certain criteria. Classification predicts categorical (unordered) labels, prediction models continuous valued functions [2].
- Basic techniques for data classification are decision tree classifier, Bayesian classifier, Bayesian belief networks, rule-based classifiers, and support vector machines. Methods for prediction include linear regression, non-linear regression, etc.
Clustering & Regression Analysis

- **Clustering** is the method by which similar type of records are grouped together. Usually, clustering is done to give the end user a high-level view of what is going on in the database. Clustering is useful for coming up with a birds-eye view of the business [4].

- **Regression analysis** helps us understand how the typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held fixed. Regression analysis is widely used for prediction and forecasting.
…Visualization

- Visualization refers to the presentation so that users can view complex patterns.
- According to Friedman (2008) the main goal of data visualization is to communicate information clearly and effectively through graphical means.
- It is used with other data mining models to provide a better and clearer understanding of the discovered patterns or relationships.
Taxonomy of Data Mining Tools

• Today there are various data mining tools available in the market.

• These tools can be broadly placed in following three categories (table 1):
  • General purpose tools
  • Integrated DSS / OLAP / tools
  • Application specific tools
### Taxonomy of Data Mining Tools

<table>
<thead>
<tr>
<th>GENERAL PURPOSE</th>
<th>INTEGRATED DSS/OLAP/DM</th>
<th>APPLICATION-SPECIFIC</th>
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<tbody>
<tr>
<td>• SAS Enterprise Miner</td>
<td>• Cognos Scenario</td>
<td>• KD1 (Knowledge Discovery One)</td>
</tr>
<tr>
<td>• IBM Intelligent Miner</td>
<td>• Business Objects</td>
<td>• ESTARD Data Miner</td>
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<tr>
<td>• Unica Pattern Recognition Workbench</td>
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<td>• Unica Detect</td>
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<td>• IBM SPSS Modeler</td>
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<td>• Unica Leaders</td>
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<td>• Ghost Miner</td>
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<td>• Unica Predictive Insight</td>
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<td>• XLMiner</td>
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<td>• CART &amp; MARS</td>
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<td>• SGI Mineset</td>
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<td>• Rapid Miner</td>
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DATA MINING CHALLENGES AND OPPORTUNITIES IN CRM

Developing deeper models of customer behavior:

• One of the key issues in CRM is how to understand customers. Current models of customers mainly built based on their purchase patterns and click patterns at web sites. Such models are very shallow and do not have a deep understanding of customers and their individual circumstances. Thus, many predictions and actions about customers are wrong.

• It is suggested that information from all customer touch-points be considered in building customer models. Two specific issues need to be considered here. First, what level should the customer model be built at, namely at the aggregate level, the segment level, or at the individual level? Second is the issue of the dimensions to be considered in the customer profile.
• There is a strong requirement for data integration before data mining:

In both cases (DM & CRM), data comes from multiple sources. For example in CRM, data needed may come from different departments of an organization. Since many interesting patterns span multiple data sources, there is a need to integrate these data before an actual data mining exploration can start.
DATA MINING CHALLENGES AND OPPORTUNITIES IN CRM

- **Diverse data types are often encountered, which requires the integrated mining of diverse and heterogeneous data:**

In CRM, while dealing with this issue is not critical, it is nonetheless important. Customer data comes in the form of structured records of different data types (e.g., demographic data), temporal data (e.g., weblogs), text (e.g., emails, consumer reviews, blogs and chat-room data), audio (e.g., recorded phone conversations of service reps with customers).
DATA MINING CHALLENGES AND OPPORTUNITIES IN CRM

- **Acquiring data for deeper understanding in a non-intrusive, low-cost, high accuracy manner:**

In many industrial settings, collecting data for CRM is still a problem. Some methods are intrusive and costly. Datasets collected are very noisy and in different formats and reside in different departments of an organization. Solving these pre-requisite problems is essential for data mining applications.
CONCLUSIONS

• Data mining is a growing discipline which originated outside statistics in the database management community, mainly for commercial concerns.

• Data mining can be considered as the branch of exploratory statistics where one tries to find new and useful patterns, through the extensive use of classic and new algorithms.

• Application of CRM tools in business gives a new dimension.

• It proved beneficial but applying DM in CRM was further more beneficial.
CONCLUSIONS

• Although the data mining tools market is relatively small, at the same time the data mining application solution market is growing exponentially.

• Our main focus was on customer retention techniques to enhance our customer relationships via Data Mining.

• Data Mining would fasten up the process of searching large databases so as to extract customer buying patterns, to classify customers into groups which also make databases to be handled efficiently.
References

[1]. www.wikipedia.org


[8]. V. Dhar, R. Stein, “Seven Methods for Transforming Corporate Data into Business Intelligence”, Prentice Hall of India.


THANK YOU!