ABSTRACT

In today's business driven world retaining the customers is the major issue in the customer relationship management. Data mining technique helps in addressing this issue. The main aim of this paper is to analyze how the different data mining techniques have been used in various CRM stages and thus making the CRM better.

1. Introduction:
CRM started in the late 1990’s when the organization realized that According to chen et.al Customer relation management can be defined as the combination of people, process and technology. Another definition says that CRM is the process of interacting with the current and future customers and analyzing the history of customers with the organization which helps in improving the relationship with the customers which increases the customer retention which in turn improves sales growth of the business. CRM is broadly classified into 3 types i) operational CRM ii) Analytical iii) Collaborative. Operational CRM is nothing but the automation of marketing activities. Analytical CRM plays major role in analyzing the customer and predict the futuristic returns from the customer so proper plan on the investment can be made. Collaborative CRM deals with how various departments work collaboratively by sharing the information among them. In this paper we consider the analytical CRM and we will be studying how data mining techniques play an important role in customer relation management.

2. Overview of CRM
CRM usually considered having the four dimensions.
   i. Customer identification
   ii. Customer Attraction
   iii. Customer Retention
   iv. Customer Development

Customer identification:
The very first step in CRM is to identify the target customers that is who will be most profitable customers to the organization. This also involves the classification or segmentation of the customers.

Customer Attraction:
After identifying the customers the organization has to make efforts in attracting the customers. For example providing gift coupons will be one of the ways of attracting the customer.

Customer Retention:
This is the major concern of all the organizations. This is measured in terms of customer satisfaction. Retaining the gained customer is most important than getting the new customers.

Customer Development:
This Deals with customer loyalty, i.e how far the transaction performed by a customer can be increased which benefits for both the organization and the customer. This involves some analysis like market basket analysis, cross selling analysis and customer lifetime analysis.

3. DATA MINING:
Data mining is the process of extracting useful information from raw data. Data mining can also be defined as analyzing the data from different perspectives and summarizing it into useful information.
4. DATA MINING TECHNIQUES
The main objective of data mining is to develop a data model from the data. Following are the various data modeling techniques,

- Association
- Classification
- Clustering
- Forecasting
- Regression
- Sequence Discovery
- Visualization.

Classification and clustering is used in customer identification, Association, classification and clustering is used in customer attraction, Forecasting, Regression and Sequence discovery is used in Customer retention and Visualization is used in customer development.

5. APPLICATION OF DATA MINING IN CRM:
Data mining acts as the backbone for the effective CRM. Data mining has its evolution phases like Data Collection in late 1960’s, Data Access in 1980’s, Data Navigation in 1990’s Data Mining in 2000. Customer provides data to the organization.

[1] Bang nguyen et al., have discussed about the CRM, What are the advancements in CRM, its pitfalls and the opportunities for research in CRM.

[2] A Detailed Study on how IT has emerged into CRM and how different the CRM has become after incorporating IT was studied by Linda D. Peters.

[3] This paper deals with how data mining helps in improving the marketing channel of the organization. A Systematic methodology of applying Data mining and knowledge management for marketing has been provided by the authors.

[4] The Data has to be processed before applying any Data mining technique. This paper studies the various preprocessing techniques and its impact on the classifiers performance of decision trees, neural networks and SVM. The impact of preprocessing is also empirically verified.

[5] Though there are many Data mining techniques which can be applied for the effective CRM, Cost effectiveness is maintained only when the appropriate technique is used. A comparative study is done between CHAID and neural networks in the situation where the cost of customer acquisition has to be lowered and the life time value of customer has to be improved.

[6] Liao et al., have studied how association rules and cluster analysis will help in adopting the new business method to improve the sales of hypermarket in Taiwan. At first, the association rules are applied on the customer data according to the customer consumption and then the clusters have been formed, Catalog is redesigned for each cluster based on each cluster consumption preferences. Implementing these two techniques the Care four-Hyper market in Taiwan was able to know whether providing the online purchasing option to the customer will be profitable or not.

[7] Apparel industry is one of the most profitable industries, but these industries suffer from production management and marketing because of lack of standard size charts. In this paper the authors empirically show how k-means algorithm and ANOVA are used in developing the standard size charts thereby improving the production and marketing management of the apparel industry.

[8] In this data driven era the customer behavior can be studied in many ways, one among them is the usage of mobile networks, In this paper the authors have proposed a model where the customer is studied based on movement, consumption, communication, and 3 different clusters have been formed which then integrated with ARPU model which gives the behavior pattern in detail which in turn helps the service provider.

[9] Today everything goes online; In this paper the author describes the role of online customer reviews in affecting the online purchase of a product.

[10] This paper deals with how event logs in the CRM platform can be used to study the behavior of the customer. Event log is maintained in the CRM platform like SAP since the event has been initiated by the customer. The author has proposed a technique where the process mining clusters and predicts the customer behavioral pattern.

[11] In this paper the author describes how the sentiment analysis helps in achieving the customer relationship management.

[12] Customers provide their opinion on products in many social websites. A framework has been proposed where the opinion of the customers are mined which is used to compare the product features.
In this paper the author proposed a new approach to detect the customer behavior by combining the process of clustering and sequence mining. This framework helps in finding the customer decisions which in turn help in improving the business which are influenced by customer actions.

[14]. The author has taken an effort to explain the role of information fusion in opinion mining.

[15]. Social media is accessed by most of the customers today the authors have taken effort to identify the data mining techniques which are often used in the social media. As a result of the survey it is identified that 19 data mining techniques have been applied confined to 9 research objectives.

In this paper a novel approach has been proposed to assess the customer loyalty. A new framework has been proposed in addition to k-means algorithm. The methodology has been applied and it has given the tremendous results to the organization.

In this paper the author has proposed the Fast Lead User Identification framework which is used in identifying the Lead users in social site (Twitter). Lead Users are those who tend to experience needs before the rest of the marketplace and stand to benefit greatly by finding solutions to those needs. FLUID is the system which identifies the lead user in the micro blogging site twitter.

[18]. Competitive intelligence is one of the most important risk driven factor in business. The proposed methodology helps in visualize and compare the products from the online reviews given by the customer. This in turn helps the product manufacturer to gain the competitive advantage and improve their process of development.

Conclusion:
The goal of CRM is to maintain the relationship with the customer. In this paper various Data mining approaches to CRM have been reviewed from the published work. As per the analysis whatever done so far we can understand that Currently the Data mining in CRM is moving towards the web mining.

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