

Improving Customer Relationship Management Using Data Mining Cluster Analysis Approach - A Review

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Abstract - Customer Relationship Management (CRM) refers to the approaches and tools that help organizations to maintain customer relationships in a structured way. Data Mining is the process that uses a variety of data analysis techniques to generate new rules & patterns and describe the relationships in data that may be used to make accurate forecast for future. It can help to select the right persons on whom to be focus or decide which new product their customers might be interested in. Customer satisfaction plays an important role in any organization to maintain the CRM. The main purpose of this research is to determine the role of data mining to enhance customer relationship management of an organization using cluster analysis. In this research it is proposed to design a tool based on clustering technique by hierarchical agglomerative methods in order to measure the satisfaction of customer. Also this research examines about the role of data mining in an organization to improve customer relationship management.

Keywords - CRM, data mining, clustering technique, clustering agglomerative technique, customer satisfaction.

I. INTRODUCTION

The main goal of CRM is the capability to handle the customer interaction at different stages and functions in an organization, for building loyal and profitable customer relationships. In fact that the fruitful company not only put customers first, but put customers at the centre of the organization because the changes in customer behaviour determines unpredictable profitability and may be the cause for inefficient marketing planning. Customer Relationship Management (CRM) is an enterprise customer-centric approach that uses different techniques to understand and influence consumer behaviour. It is a process which has three objectives as to improve customer satisfaction, enhance customer loyalty or increase profitability. [1] The core part of CRM activities is to understand customer requirements and retain profitable customers. To reach it in a highly competitive market, satisfying customer's needs is the key to business success [2]. Unprecedented growth of competition has raised the importance of retaining current customers. Retaining existing customers is much less expensive and difficult than recruiting new customers in a mature market. So customer retention is a significant stage in Customer Relation Management, which is also the most important growth point of profit [3].

Data mining is implemented by most of the organizations with a strong customer concerned with communication, financial, marketing and retail organizations. [4]. It allows these firms for determining links among internal factors like positioning of product, price and employee skills and external factors like competition, indicators for economy and demography of the customer. It allows them to identify the effect on satisfaction of customer, sales and corporate profits. It involves 5 minimum elements specifically extracting, transforming and loading data of transaction onto the system of data warehouse; storing and managing the data in multidimensional database; providing access of data to professionals of information, technology and business analysts; analysing the data by the software for application and presenting the data in the understandable way like table or graph. Data mining includes 4 categories of tasks such as classification, clustering, association rule learning and regression. Clustering is the task of identifying structures and groups in the data which are some way or other same way, without adopting known data structures. [5]. Types of clustering technique or methods such as model-based methods; a hierarchical agglomerative methods; grid-based methods; partitioning methods and density based methods. [6]

It was observed that satisfaction of the customer refers to variance between the present situation of the customer and his expectations are recognized as a main prerequisite for retaining the customer. [7]. Ultimate aim of the programs in the customer relationship is to produce a higher customer satisfaction level. Managers think that consumers match expectations and realizations towards the performance of the product and it is critical for them for delivering such effective performance at higher expectations level maximize because of intensified Competition and modifying consumer requirements.

II. RELATED WORK

It was found that the data mining techniques are used for to maintain the customer relationship management. In this the neural network, the support vector machine and the decision tree are some of the commonly used data mining techniques used to improve the satisfaction level of the customer. Apart from these, association, clustering, regression, forecasting, sequence discovery and visualization are some of the other data

mining techniques. Clustering technique is considered as the essential task in the data mining process. [11]

It was investigated the necessities of data mining in the banking system and the customer relationship management (CRM). Data mining in bank is used to detect the huge number of data, to discover the pattern, hidden laws and it is also used to identify the pattern of customer behaviour. Data mining in CRM is used to enhance the value of the customer. [12] This data mining tools are created the new opportunities in trading sector and hence it improves the customer satisfaction at high level. Data mining is considered as the important element in the customer relationship management. It has played an important role in the many organizations to meet the requirements of the customer in effective manner. The activities of data mining process can be classified in to three categories such as explore, prediction model and the court's analysis.

Data mining tools have played an important role in the leading bank sector. Data mining tools are used for customer segmentation, approval and scoring of credit, profitability, predicting the payment, marketing and detecting the fraudulent transactions.[14] Marketing, risk management, fraud detection and acquisition and retention of customer are some of the areas in banking industry which are effectively used the data mining system. Moreover, the data mining are also engaged with the cash management, forecasting operations and ranking investments. These activities have improved the customer satisfaction in the banking organization. Data mining is helped to target new customer for products and services and it is used to analyse the account of the customer and meet the requirement of the customer.

It was investigated the data mining solutions for the business environment. Data mining can be applied in the many fields such as business, education, science and engineering. This data mining played an important role to enhance the customer satisfaction. [15]. There are six data mining techniques used to handle the large volumes of data. These techniques include classification, regression; summarization, and anomaly detection, association rule learning and clustering. The data mining is used to improve the customer experience and helps the organization to achieve the competitive advantage over other. Customer segmentation, customer retention, market basket analysis, credit scoring and the price optimization are some of the applications of data mining methods.

Data mining provides careful analysis which has the ability to optimize the internal network operations. It also provides better management to face customer activities such as churn and marketing. Some of the data mining techniques are used on the customers are naïve bayes (NB), support vector machine (SVM), neural network (NN) and the regression analysis. [16] Moreover the regression analysis acts as the best tool to measure the customer satisfaction. Apart from these, the artificial neural network (ANN) to the cluster customer has the ability to calculate the loyalty level and the buying behaviour of the customer.

Customer satisfaction is related with the loyalty in which it is based on the switching costs, benefits and the characteristic of customer and other demographic factor. Markov model is used to examine the past and future behaviour of customer through

data mining process. Principal component analysis is used to reduce the data. [17]. Regression model is predicted by using the step wise method which is also used for the behavioural intentions model. These are used to enhance the customer satisfaction of an organization.

It was investigated the customer relationship management using the data mining techniques. Data mining is the process which uses the different analysis of data and the modelling techniques. These are also used to discover the patterns and data relationship to make the predictions accurately. Data mining with the customer relationship management has enhanced the customer satisfaction at high level. There is a positive relationship between the satisfaction of the customer and the profits. [18]

Clustering and principal component analysis is some of the approach of data mining technique used to improve the customer satisfaction. [19] Data conversion process, computing cluster statistic and the select the method of clustering are some of the general clustering method used to empower the customer satisfaction. This clustering algorithm includes partitioning method (PAM), the density based method, model based method; grid based method and hierarchical method. The overall satisfaction of customer can be evaluated by using the data mining process. The Customer relationship management (CRM) is the best strategy of competitive business environment. This is positively related to the data mining process in which it enhances the business performance and customer satisfaction. [20].

III. FINDINGS OF THE STUDY

This study examines about the role of data mining in an organization towards improve customer relationship management. The research gap predicted in this study is that there is no study on the relationship between the data mining and the customer satisfaction. This study will be useful to know many techniques of the data mining in various organizations. Data mining is an important technique to predict the behaviour of an organization and the customer. It aims to improve the customer satisfaction by offering many solutions. Data mining acts as the tool to support the decision making and planning process of an organization. Correct recognition of data is done by using the data mining process in which it makes the customer to feel happy. This study proves that the data mining satisfies the need of customer in all type of an organization.

IV. PROPOSED SYSTEM

With the help of this study we are going to develop a tool that would implement data mining techniques that is clustering techniques in that hierarchical agglomerative methods for measuring the satisfaction of customer. Developed tool will have a graphical user interface and can be practically adopted for demonstrating the process. From the managerial point of view, marketing managers are surveyed from different organizations belong to with specific reference to India are surveyed after implementation and demonstration of the developed tool. Then the outcomes of the survey are adopted for comparing the measurement effectiveness in the process of

V. METHODOLOGY

1. Data Collection and verification.

Simple random sampling was adopted as sampling technique to measure the customer satisfaction with specific reference to any in Indian organizations. Data is collected through second handed and primary type of research. Primary source of data are gathered with the help of survey questionnaire. Secondary source of data are gathered with the help of existing works like electronic books, websites, company websites, internets, articles, government publications, diaries, newsletter and more. After collecting the primary data they must be scrutinized through arithmetical tools like chi square tests, graphical method and analysis of percentage and at the same time correlation test was adopted to estimate the results. Examiner will make use of SPSS to conclude the statistical outcomes from arithmetical methods. To check the quantitative approach, reliability and validity parameters are supported.

2. Clustering agglomerative approach:

Cluster is a collection of data objects similar set of objects grouped together within the same cluster but they are very dissimilar to the set of objects in other clusters (i.e group).

Cluster analysis is grouping a set of data objects into clusters and is performed on following basis

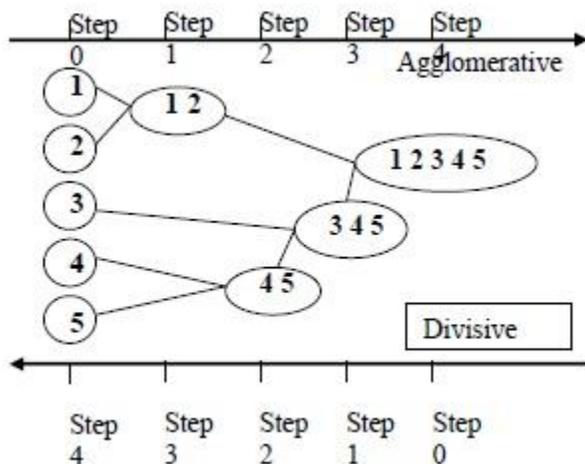


Fig1. Clustering agglomerative and Divisive Technique

The hierarchical agglomerative technique is a bottom-up approach in which small clusters, initially containing an own data objects, are combined together to form bigger clusters. At each step of the agglomeration process, the two neighbouring clusters are fused together to form a new cluster. For this the key variables for indicating customer satisfaction are to be finding out. On this key parameters basis different clusters will form that clusters will help to find out the customers satisfied and unsatisfied ratio and because of that managerial level people can take decision on which parameter they have to focus to enhance customer satisfaction in an organization.

Clusters fused together on the basis following distances between two clusters

- **Single Link:** Minimum distance between two clusters data objects.

- **Complete Link:** Maximum distance between two clusters data objects.
- **Average Link:** average distance between two clusters data objects.
- **Centroid:** distance between two clusters centroids.

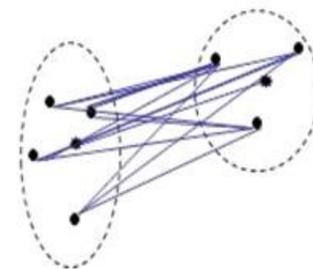


Fig 2. Distance between Clusters

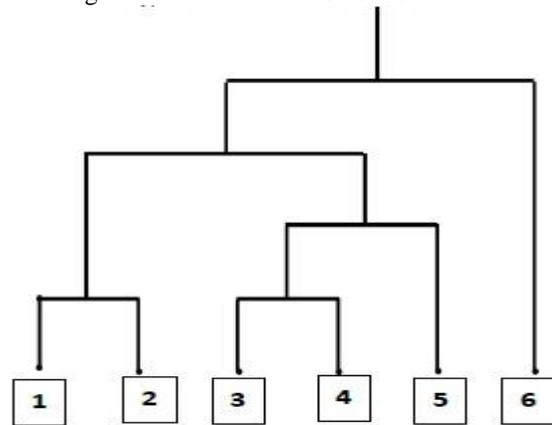


Fig.3. Dendrogram

Dendrogram a tree data structure which illustrates hierarchical clustering techniques in following ways.

- Each level shows clusters for that level.
Leaf – individual clusters
Root – one cluster
- A cluster at level *i* is the union of its children clusters at level *i+1*.

VI. CONCLUSION

The obtained model is not only providing reasonable support to the organization but it improves customer satisfaction and continues long live relation with them. This model proves that data mining is a backbone for concealed information about most profitable customers. In this paper enormous customer database is segmented and categorized by using clustering then clustering agglomerative technique will applied to enlarge data mining model to identify them and finally clustering generates new rules and patterns for enhancing customer satisfaction.

VII. FUTURE WORK

On the basis of Clustering agglomerative technique to design, develop and implement this proposed model and analyze the satisfaction level of customers towards the organization and measure effectiveness of this model which will be helpful to improve the CRM of an organization. Also proposed model will

be updated by customer survey and questionnaire and we can enhance our structure model by surveying customers and generating new patterns that will give very productive results to organization. By using different data mining techniques we can improve our model.

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