

DECISION SUPPORT SYSTEM FOR CRM IN ONLINE SHOPPING SYSTEM



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ABSTRACT

Customer Relationship management (CRM) is a seriously considered issue in today's competitive corporate world. For a firm to maintain an intact relationship with its customers, the vast amount of data within a business enterprise can be refined, mined and analyzed. This paper proposes a Decision Support System for analyzing and retaining the customers in an Online shopping System using various data mining techniques. To achieve successful Customer relationship management various mining algorithms for pattern extraction from data have been utilized. Managerial decision makers can make use of these patterns for raising the profit graph of the firm.

Keywords: Association rules, clustering customer relationship management, data mining, decision support system, decision tree, frequent item set, online shopping system.

1. INTRODUCTION

In today's world enormous amount of data are stored in databases and data warehouses making it increasingly important to develop powerful tools for analysis of such data and mining interesting knowledge from it. Data mining has been written in

almost as many ways as there are authors who have defined it. According to M.J.A Berry and G.S Linoff, "Data Mining is the process of exploration and analysis by automatic or semiautomatic means, of large quantities of data in order to discover meaningful patterns and rules." These patterns can be analysed to make various decisions for enhancing the relationship with customers to make the firm highly profitable. Thus the overall goal of the data mining process is to extract information from a data set and transform it into an understandable structure for further use.

Decision support systems are computer based information systems that supports decision making activities. It analyses business data and provide interactive information support to managers and business professionals during the decision making process, from problem recognition to implementing the decision. DSS allow faster decision making, identification of negative trends and better allocation of business resources all to the benefit of organization [9].

DSS become a very powerful tool only when its integrated with customer relationship management, which enables businesses to understand the customers, retain customers through better customer experience ,attract new customer, win new clients and contacts, increase profit and decrease

customer management costs. Implementation of this integrated system will help to increase the profit of the firm at a high rate.

In this paper we apply data mining and Statistical algorithm those are, K-means clustering algorithm, Decision tree algorithm, Classification algorithm and Correlation analysis. We use association rule mining to determine the buying habits of customers and set offers to them in an Online Shopping System. Prediction rules are then used to derive a conclusion that can help in Knowledge management and decision making.

2. THE REQUIRMENTS AND ISSUES

CRM is a technological combination of people and processes which seek to understand a company's customers. It focuses on integrated approach to manage relationships on customer retention and relationship development.

For an industry to develop constant increase in number of customers is needed as well as the old customers should be maintained because it is easier and more cost effective to maintain old customers than investing time and money in gaining new customers. So maintaining existing customers should be the main focus of an enterprise [7].

As online activity increases, a number of issues become critical: development and management of a large number of predictive models must be supported by the technology used; to make customer communication efficient the process of monitoring of the campaign and predictive model performance must be automated; and the predicted rules must be accurate enough to make appropriate decisions.

3. PROPOSED SYSTEM

The decision support system for Customer Relationship management in Online Shopping system proposed here consists of three processes. They are:

A. Clustering:

It's an unsupervised learning task of grouping a set of objects in such a way that objects in the same group

are more similar to each other than to those in other groups. Clustering approaches is based on the principle of similarity maximization among intra-class objects and similarity minimization among inter-class objects.

K-means is the most famous algorithm used for clustering where a large dataset is partitioned into various clusters. In the proposed system purchase amount collected from the dataset is used to set the current trends in customer purchasing [4].

B. Classification:

Classification is a supervised learning task where previously unseen records should be assigned a class as accurately as possible. Class is one of the attribute of a set of attributes contained in each record. Data are arranged into predefined groups with the use of different algorithms.

ID3 algorithm is used in this system for classification. ID3 is a simple decision tree learning algorithm. The basic idea of ID3 algorithm is to construct the decision tree by employing a top-down, greedy search through the given sets to test each attribute at every tree node. In order to select the attribute that is most useful for classifying a given sets, introduce a metric---information gain. The main advantages of the ID3 algorithm are that it is easily implemented, being quite a simple process, and its running time increases only linearly with the complexity of the problem [3].

Classification of the customer profit is done based on certain criteria. In the proposed system the classification is done based on the age of the customers who shop from the online shopping website.

C. Prediction:

Prediction is an attempt to form patterns that permit it to predict the next event(s) from the given the available input data.

Association method is thus applied to the clustered data to create association mining rules. Association rule is used to find relationship among

data objects. It observes the frequency sets occurring simultaneously in database. It is based on two threshold values support and confidence. Support, identifies the frequent item sets and confidence is the conditional probability that an item appears in a transaction when another item appears [5].

Thus in the proposed system these rules are used to help the decision maker to generate various attractive offers which will help the firm to develop its relationship with the customers.

4. IMPLEMENTATION DETAILS

The DSS implemented here have an online shopping website where the customer transactions are stored in the data warehouse. Data mining techniques are applied to this huge amount of data to support decision makers in making relevant decisions. The linear methodologies that have to be implemented in order to achieve the successful decision support system for customer relationship management are shown in figure 1.

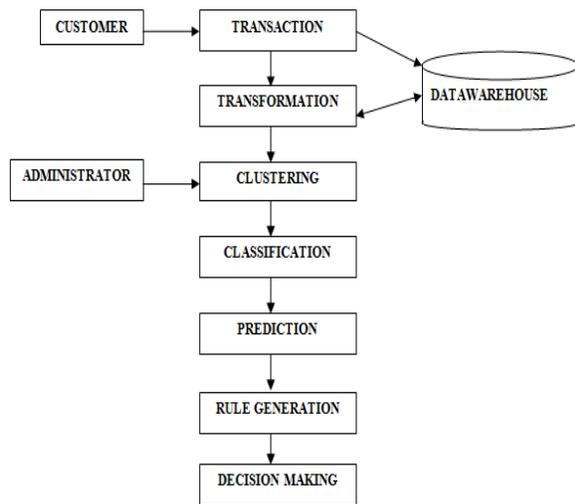


Figure 1: Proposed Methodology

Step 1: The system implemented here has an online shopping website where the transactions, product details and customer details are randomly placed in a data warehouse. These collected details maybe of different forms which is thus transformed.

Step 2: The transformed data is then clustered on the bases of the purchase amount collected from the

dataset. Clustering is performed using the k-means algorithm, where the given dataset is partitioned into a user specified number of clusters. Here the data is clustered into three clusters, High transaction amount Medium transaction amount and Low transaction amount.

Step 3: Classification, is the grouping of data into predefined classes. The classes here are decided on the bases of attributes like age, gender, income or location of the customers. In order to achieve this, a decision tree structure is created using ID3 algorithm. In this process the tree begins from the transaction parameter which has the most information gain or in simple words lead to a positive result.

Step 4: The customer analysis and transaction behavior details gained from the decision tree is used to generate prediction rules. Prediction rules thus created makes prediction of the future customer transactions possible.

Step 5: Association rules are set to find the relationship among data objects. Using the association rule mining techniques the association rules are generated for campaign management. It observes the frequency sets occurring simultaneously in order to generate attractive offers for the customers.

5. CONCLUSION

We identified the need for implementing the decision support system for customer relationship management. In today's entrepreneur's world where the customer rules, it's very important to keep in track about the profitable costumers and their various requirements. Therefore decision support system plays a very important role in taking various decisions regarding customer relationship management. To maintain a profitable business it is important to retain the already existing customers rather than attracting new one. Therefore DSS is necessary to decide on certain rules regarding the relationship between the business entities and the customers. It is based on these rules that we decide whether to maintain a particular customer or drop them.

The system proposed here provides various techniques for decision support system implementation in an online shopping website. The customer transactions and product details from the website are stored in a data warehouse. These stored data are further mined and processed in order to gain a visual representation of the output. The output thus obtained helps the decision maker to provide the customers with various attractive offers to develop their relationship with the firm.

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