Expert Systems with Applications 37 (2010) 5259–5264

Contents lists available at ScienceDirect

Expert Systems with Applications

journal homepage: www.elsevier.com/locate/eswa

Cluster analysis using data mining approach to develop CRM methodology to assess the customer loyalty

Seyed Mohammad Seyed Hosseini *, Anahita Maleki, Mohammad Reza Gholamian

Industrial Engineering Department, Iran University of Science and Technology, Tehran, Iran

ARTICLE INFO

Keywords:
Customer relationship management
Customer loyalty
K-Means algorithm
RFM model

ABSTRACT

Data mining (DM) methodology has a tremendous contribution for researchers to extract the hidden knowledge and information which have been inherited in the data used by researchers. This study has proposed a new procedure, based on expanded RFM model by including one additional parameter, joining WRFM-based method to *K*-means algorithm applied in DM with *K*-optimum according to Davies–Bouldin Index, and then classifying customer product loyalty in under B2B concept. The developed methodology has been implemented for SAPCO Co. in Iran. The result shows a tremendous capability to the firm to assess his customer loyalty in marketing strategy designed by this company in comparing with random selection commonly used by most companies in Iran.

© 2009 Elsevier Ltd. All rights reserved.

1. Introduction

In a B2B environment, suppliers and/or service providers usually need to understand the nature and characteristics of their customers. As customer attraction and satisfaction are the main objectives of any leading company, so the main objective of this article is to provide an effective and efficient methodology to be used for implementing the firm's objective to the best of possible. This part mainly reviews the studies related to customer relationship management, customer loyalty, RFM model, *K*-means algorithm.

1.1. Customer relationship management

Since the early 1980s, the concept of customer relationship management in marketing, and consists of four dimensions: customer identification, customer attraction, customer retention and customer development has gained its importance. It is difficult to find out a totally approved definition of CRM. We can describe it as a comprehensive strategy and process of acquiring, retaining and partnering with selective customers to create superior value for the company and the customer (Parvatiyar & Sheth, 2004). CRM is a comprehensive business and marketing strategy that integrates technology, process, and all business activities around the customer (Anton, 1996; Anton & Hoeck, 2002). Brown points out that CRM as "the key competitive strategy you need to stay focused on the needs of your customers and to integrate a customer-facing approach throughout your organization" (Brown, 2000). Chatterjee also defines CRM as a discipline which focuses on automating and improving the business processes associated with managing customer relationships in the area of sales, management, customer service, and support (Chatterjee, 2000). According to Feinberg and Kadam, profits increase by 25–80% when customer retention rates increase by five points (Feinberg & Kadam, 2002). CRM projects often fail and only about 40% of CRM implementations are successful (Feinberg & Trotter, 2001).

1.2. Customer loyalty

Creating a loyal B2B customer base is not only about maintaining numbers of customer overtime, but it is creating the relationship with business customers to encourage their future purchase and level of advocacy. Equipped with the knowledge of their business customers' loyalty levels, a supplier will be able to figure how their endeavors to maintain good relationships can contribute to its profit levels. Some authors believe that loyal customers offer a steady stream of revenue for a company by remaining with the brand/supplier and rejecting the overtures of competitors (Lam, Shankar, Erramilli, & Murthy, 2004; Reichheld & Teal, 1996). Considering this with the nature of large purchase and transactions in a B2B setting; there are gigantic rewards for those suppliers who succeed in creating and maintaining loyal customers.

Some Authors have proposed several theories to link variables that one usually finds in relationship marketing and business marketing to the loyalty construct. In the B2B context, evidence shows that relationship elements affect customer loyalty. For example, Ricard and Perrien found that relationship practices have a direct impact on customer loyalty (Ricard & Perrien, 1999). Other Authors

---

* Corresponding author. Tel.: +982177240447; fax: +982177240482.
E-mail addresses: seyedhoseini@iust.ac.ir (S.M.S. Hosseini), anahitamaleki@yahoo.com (A. Maleki), gholamian@iust.ac.ir (M.R. Gholamian).

0957-4174/$ - see front matter © 2009 Elsevier Ltd. All rights reserved.
doi:10.1016/j.eswa.2009.12.070

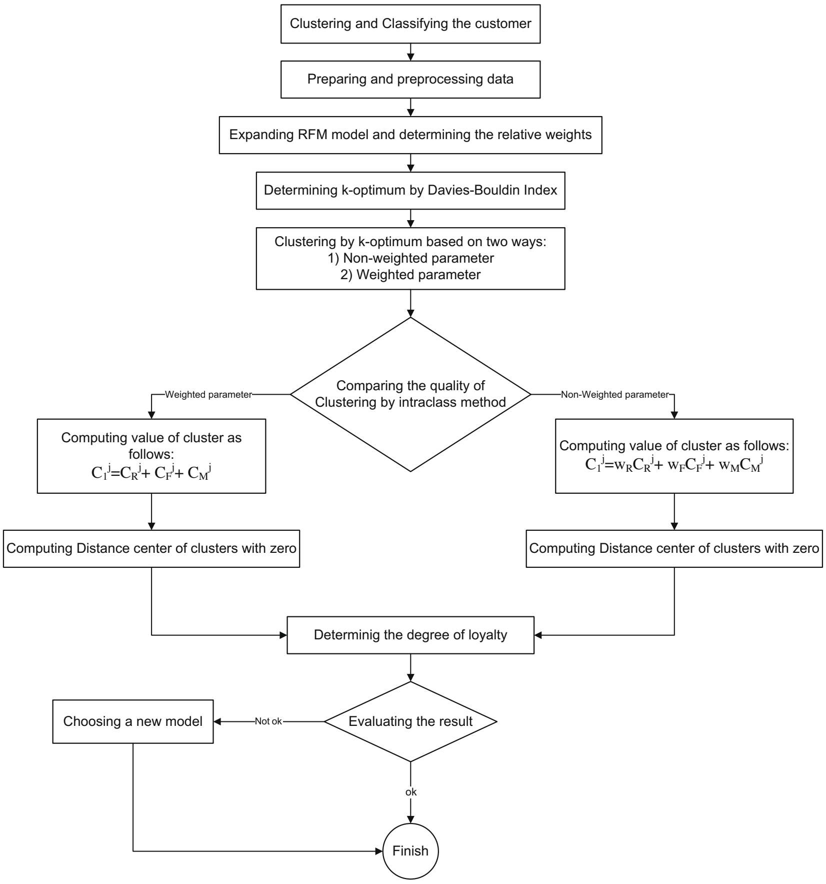
Clustering and Classifying the customer
Preparing and preprocessing data
Expanding RFM model and determining the relative weights
Determining k-optimum by Davies-Bouldin Index
Clustering by k-optimum based on two ways:
1) Non-weighted parameter
2) Weighted parameter
Comparing the quality of Clustering by intraclass method
Weighted parameter
Non-Weighted parameter
Computing value of cluster as follows:
$C_1^j=C_R^j+C_F^j+C_M^j$
Computing value of cluster as follows:
$C_1^j=w_RC_R^j+w_FC_F^j+w_MC_M^j$
Computing Distance center of clusters with zero
Computing Distance center of clusters with zero
Determinig the degree of loyalty
Choosing a new model
Not ok
Evaluating the result
ok
Finish

Fig. 1. Proposed method.

provide empirical evidence linking several constructs such as relationship quality, trust, involvement, satisfaction, purchase development, organizational change, and switching costs to influence B2B customer loyalty and retention (Chow & Holden, 1997; Eriksson & Vaghult, 2000).

In some researches, customer lifetime value (CLV) or loyalty is evaluated in terms of recency, frequency, monetary variables namely the integrating rate of each cluster, that is $C_1^j = w_R C_R^j + w_F C_F^j + w_M C_M^j$, where w_R, w_F, w_M are the relative importance of the RFM variables (Liu & Shih, 2005).

Other researches for classifying customer value have proposed a model based on computing the distance between the center of cluster and zero point as high value refers to most customer loyalty (Cheng & Chen, 2008).

1.3. RFM analysis

RFM analysis[1] has been used in direct marketing for several decades (Baier, Ruf, & Chakraborty, 2002). This technique identifies customer behavior and represents customer behavior characteristics by three variables as follows:

(1) Recency of the last purchase which refers to the interval between the time that the latest consuming behavior happens and present.
(2) Frequency of the purchases which refers to the number of transactions in a particular period.
(3) Monetary value of the purchase which refers to consumption money amount in a particular period.

RFM analysis is utilized in many ways by practitioners; therefore, RFM analysis can mean different things to different people. Classic RFM implementation ranks each customer on valuable parameters against all the other customers, and creates an RFM score for each customer/product.

The first step is to sort the customer file according to how recently customers have purchased from the firm. Then database divided into equal quintiles and these quintiles are assigned the numbers 5 to 1. Therefore, the 20% of the customers who most recently purchased from the company are assigned the number 5; the next 20% are assigned the number 4, and so on. The next step involves sorting the frequently, monetary. Therefore, the database is divided into 125 roughly equal groups (cells) according to recency, frequency, and monetary value. Customers/products with high scores are usually the most profitable (Hughes, 1994; Stone, 1995).

1.4. K-Means algorithm

Clustering is the process of grouping a set of physical objects into similar groups. A cluster is a collection of data objects that are similar to one another within the same cluster and are dissimilar to the objects in other clusters (Han & Kamber, 2001). *K*-Means is one of the well-known algorithms for clustering which is very sensitive to the choice of a starting point for partitioning the items into K initial clusters. We can compare the performance of different clustering methods using intraclass method when the number of fixed cluster of K value is defined as $F(K) = 1\Big/K\sum_{n=1}^{k}\sum_{c_i} Dist(c_i, c^n)$. (Michaud, 1997; Shina & Sohnb, 2004).

---

[1] Recency, Frequency and Monetary.

Download English Version:

https://daneshyari.com/en/article/386460

Download Persian Version:

https://daneshyari.com/article/386460

Daneshyari.com