

Understanding Customer Behavior through Collaboration RFM Analysis and Data Mining Using Health Life Center Data

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INTRODUCTION

Sports provides an outlet for athleticism and competitions, such as the Olympics and World Cup, as well as personal activities done for health reasons. In turn, sports activities generate a nearly infinite amount of data, such as individual player performance, managerial decisions, and the income sports organizations derive. For that, the most important question remains, “How can we use this data efficiently?” Sport center managers can turn this data into meaningful and useful knowledge using several techniques, and they can use it against their competitors to create a competitive advantage. Data mining tray to extract previously unknown and potentially useful information from data (Fayyad, et al., 1996) and tray to find relations, patterns and predictive rules hidden in databases. In the past, sports data-mining did not attract considerable attention (Solieman, 2006) because of a resistance and lack of faith by sports clubs and organizational managers who focussed primarily on the results of athletes and team scores. The enormous variety of sources providing data made anecdotal opinions based on the data insufficient, however, for most sports organizations; they needed more powerful methods to extract significant information from the collected data. This lead to a need to measure athletes’ performance more precisely and to establish better decision-making by using statistical analysis. More recently, however, data-mining techniques have emerged as an important technology for revolutionizing a wide range of applications, including sports. These techniques are preferred instead of statistical methods because of their superior properties as a generalization of present condition and for making predictions -allowing sports managers to create better strategies for their teams or facilities.

Most of the work regarding sports data-mining has occurred in regard to professional sports, while life centers or amateur sports organizations, the centers of individual sports involvement, have not been analyzed as much. Nowadays, sports, fitness and health life centers have become a big and growing sector. People, especially in metropolitan areas try to stay healthy, using fitness, sauna and massage areas in these centers. To survive, these businesses, having gained strength economically and increased in numbers, need tools to maintain their customers and to predict their future needs.

As competition for sales grows tense, companies and organizations have started to appreciate their customers as their most valuable assets (Poel and Bart, 2004). The difficulty and expense of acquiring new customers exceeds that for retaining old ones (Krivobokova, 2009). Because of increasing the number

of customers and rising competition, the health life sport centers have begun to take into consideration customers' needs as a priority. Customers may each prefer different services or products. Therefore, companies should first classify customers according to their prior transactions involving services and products. Firms can identify their customers' profiles using Customer Relations Management's (CRM) concept and data-mining techniques. CRM aims to reveal customers' needs, choices and behaviours and to provide a basis for making long-lasting relationships with customers (Tsipitsis and Chorianopoulos, 2009). For that reason, with segmentation being based on customers' values and grading different relationships among different segments is important. For segmentation, customer loyalty is a suitable property, and customers' past buying behaviour shows their customer loyalty (Chang, et al., 2011). A customer who has a positive attitude towards a firm or organization and makes frequent transactions is a loyal customer. Positive attitude alone is not enough for customer loyalty - there must be an inclination for future transactions. Some experts evaluate customer loyalty with Recency, Frequency and Monetary (Seyed, et al., 2010). Customer Lifetime Value is defined as the net profit gained from a customer by an organization in the customer's total lifetime (Gupta and Lehmann, 2003). Also, RFM has recently become one of the most popular CLV model in order to extend the relationship with customers (Khajvand, et al. 2011).

There are usually two variables for evaluating customer loyalty. The first one is demographic variables such as age, gender, etc. The second one is RFM variables which express the customers' behaviours. In the RFM, Recency is a certain time from the last service transaction. Frequency is the number of transactions in a certain time. And, Monetary is fiscal benefit from the customer to the company in a certain time. Customers' behaviour can be analysed by using RFM variables. It is well known that customer past behaviour's score gives tips to predict the customer's behaviour for future (Birant, 2011). According to RFM variable scores, a company can segment customer groups and identify their most profitable customers. In this chapter, RFM scores first are used as an input for clustering algorithm to specify customer loyalty groups. Then, these groups are analyzed based on the customers' demographic variables to extract classification rules. After that, an association rule mining algorithm applied to these rules to express the relationship between customers' transactions and their demographic variables.

The remainder of this paper is organized as follows: A literature review about data-mining techniques and RFM applications is presented in Section 2. A description of the research methodology is given in Section 3. In Section 4, all the steps of the proposed model are expressed in detail using a real case study. The proposed model's results appear in section 5. The last section is the conclusion of the paper.

LITERATURE REVIEW

Data-mining techniques have been used for solving problems related to customers in areas such as engineering, finance and business (Written and Frank, 2005). In recent years, data-mining applications based on RFM concepts have been proposed for different areas. Liu and Shih (2005) developed a novel product recommendation methodology combining group decision making and data-mining techniques by using AHP, clustering and association rule mining techniques. Lo et al. (2008) adopted an RFM model to analyze members of a sports store. The results showed that higher transaction customers are male and aged between 26 and 35. Sohrabi and Khanlari (2007) used k-means clustering techniques to develop a customer live-value model and segmented the customers by taking into account their RFM values. Cheng and Chen (2009) combined quantitative values of RFM attributes and k-means algorithm with rough set theory to extract classification rules. They applied RFM to understand customer consuming

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