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Customer relationship management in the hairdressing industry: An application of data mining techniques

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ABSTRACT

With the increase of living standards and the sustainable changing patterns of people's lives, nowadays, hairdressing services have been widely used by people. This paper adopts data mining techniques by combining self-organizing maps (SOM) and K-means methods to apply in RFM (recency, frequency, and monetary) model for a hair salon in Taiwan to segment customers and develop marketing strategies. The data mining techniques help identify four types of customers in this case, including loyal customers, potential customers, new customers and lost customers and develop unique marketing strategies for the four types of customers.

1. Introduction

With increasing living standards and the sustainable changing patterns of people's lives, people, particularly for the women, spend more on improving their beauty so as to fulfill successfully their roles in various socioeconomic categories. Hairdressing is a common way for people to present a well-groomed face to the world (Kéïta et al., 2005), which mostly refers to the following services-haircuts, hairstyles, hair perming, hair color, hair care and scalp massages (Gerson, 1999).

According to the Economist (2003), Americans spend more each year on beauty than they do on education. The global beauty industry is growing at up to 7% a year, more than twice the rate of the developed world's Gross Domestic Product (GDP). Among all beauty products, the hair-related products are the most usual ones for people to use. Brown and Beale (2008) also indicate that hair-related products comprise the majority of the product amount in the global beauty industry and the hairdressing industry has multi-billion dollar impact on the American economy. In the same vain, Central Statistical Office (1995) points out that people in the UK spend over £2 billion annually on hairdressing services, which almost doubles what it pays annually for dental, medical, nursing and optical fees.

Based on the survey made by Directorate-General of Budget, Accounting and Statistics, Executive Yuan, Taiwan, until May 2010, the national employment for the service industries comprises approximately 60% of the total national employment. In 2009, the service sector's contribution in GDP is composed of 44% of GDP in all industries. At present, in Taiwan, the hairdressing industry is one of the popular service industries for the women when choosing their occupations. Hairdressers must receive the basic hairdressing certificate and can earn higher wage than ever before. Contrary to the traditional values for the hairdressing industry, the hairdressing industry is not a low-skilled and low-waged industry anymore.

The hairdressing industry has become a highly competitive industry in developed and developing economies, showing that the hairdressing industry has significant impact on the economy in developed and developing countries (Brookes & Smith, 2009; Picot-Lemasson, Decocq, Aghassian, & Leveque, 2001). There is no exception to Taiwan. Particularly, an aging population in Taiwan is growing rapidly now. People with higher age demand more frequently to change their hair styles and increase more services to disguise their graying hair. Hence, the importance of the hairdressing industry in Taiwan is increasingly growing. Taiwanese hairdressing industry has the urgent need to identify profitable customers and retain loss customers so as to effectively market the services (Wang, 2010).

Despite of the above and a plenty of management studies examining marketing strategies for the service industries (Beckett, 2000; Rafalski, 2002), prior literature rarely investigates how the customer relationship management (CRM) is implemented in the hairdressing industry and thus there is little known about the marketing strategies of the hairdressing industry. Investigating customer behavior facilitates hair salons to make marketing

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strategies according to particular demand of customers for the services (Brown & Beale, 2008). Hence, it is vital to provide examinations on how hair salons target valuable customers and make marketing strategies for different types of customers by observing customer behaviors to segment customers. For example, by observing customer behaviors, when finding that particular customers visiting a certain hair salon more frequently and more recently whereas spending less than others would expect more to cope with their dry hair, the hair salon can make particular marketing strategies for the customers such as providing the newest promotional activities and recommending preferential products that can effectively improve their hair health so as to increase their consumption in the hair salon.

Nowadays, the ability to generate useful information from data is an important issue for the industrial managers, showing the necessary for industrial mangers to use data mining (DM) techniques to find the hidden and unknown customer information from the abundant customer data and thus achieve effective CRM (Lee & Siau, 2001; Ranjan & Bhatnagar, 2011). It is common for the service industries to utilize information technology such as building CRM information system or applying DM techniques to systematically analyze customer profiles to segment customers and target valuable customers. When service providers understand customer preference, they can develop adequate marketing strategies for customers and thus can meet their demand, enhance their satisfaction for the services and increase their willingness to purchase (Deal & Edgett, 1997; Fu, Chu, Chao, Lee, & Liao, 2011; Kim, 2011; Min, 2006).

Based on the above, this paper adopts DM techniques – combining the self-organizing map (SOM) and K-means methods along with the application of RFM (recency, frequency, and monetary) model to examine a hair salon in Taiwan to effectively identify its valuable customers and develop its marketing strategies. RFM model has been extensively applied in direct marketing to systematically examine existing customer data to analyze their consumption habits, which benefits marketers to identify profitable customers in an effective way and develop adequate marketing strategies and helps marketers to seek ways to retain lost customers (Lumsden, Beldona, & Morison, 2008; Wei, Lin, & Wu, 2010).

The SOM method and K-means method have been widely used to segment customers when using RFM model (Hanafizadeh & Mirzazadeh, 2011; Huang, Chang, & Wu, 2009). Hair salons can know well the linkage between customer characteristics and customer purchasing habits via adopting the DM techniques to systematically examine customer purchasing history and expenditure records and thus they can effectively allocate the resource to customers and make marketing decisions.

The remainder of the paper is as follows. Section 2 provides the literature review on CRM and DM techniques used in this paper. Section 3 reports the methodology used to conduct this study. Section 4 presents the empirical results. Finally, conclusions, managerial implications, limitations and further research are depicted.

2. Literature review

2.1. CRM

With the increasingly changing industrial environment and increasing competition in the service industry, service industrial managers seek to build good customer relationship and add more value to services (Öztaysi, Sezgin, & Özok, 2011). CRM is defined as the adoption of information technology to develop new customers and retain old customers so as to keep long-term and closed customer relationship, which aims to improve customer relationship and thus can help increase customer loyalty, customer retention and customer profitability (Hennig-Thurau, Gwinner, & Gremler, 2002; Swift, 2001).

2.2. SOM and K-means methods

DM techniques are adopted in different areas such as marketing, market segmentation, market demand prediction and fraud in the financial and insurance industry, the telecommunication industry and the tourism industry etc., which have been widely applied to achieve effective CRM so as to help the industrial managers take marketing decisions (Ranjan & Bhatnagar, 2011; Wei, Lin, Weng, & Wu, 2012).

Among DM techniques, SOM and K-means methods are common methods to cluster groups. Cluster analysis is used to identify a set of groups that both minimize within-group variation and maximize between-group variation according to a distance or dissimilarity function (Witten & Frank, 2005). SOM is a popular unsupervised neural network methodology to clustering for problem solving (Wang, 2001) and market screening (Fish & Ruby, 2009). The SOM network is trained by an unsupervised competitive learning algorithm, which can automatically detect strong features in large data sets and thus produce two-dimensional arrangement of neurons from the multi-dimensional space. Originally, its patterns in a high-dimensional input space are very complicated. After clustering, its structure on a projected graphical map display becomes more transparent and more understandable (Churilov, Bagirov, Schwartz, Smith, & Michael, 2005).

K-means method is one of the commonly seen techniques of clustering algorithm, which involves two main steps, first to place the instances in the closest class (the assignment step) and then re-calculate class centroids from the instances assigned to the class (the re-estimation step) (Huang et al., 2009; Wu, Lin, Liao, & Shieh, 2008). The formula of K-means method typically expressed by Euclidean distance is depicted below. The distance between any two points X_r and X_s, as shown in Eq. (1), can be described by the square root of the sum of the squared distance over each coordinate, and $X_r = (x_{r1}, x_{r2}, x_{r3}, \ldots, x_{ri}, \ldots, x_{rn})$ and $X_s = (x_{s1}, x_{s2}, x_{s3}, \ldots, x_{si}, \ldots, x_{sn})$, where each c_i represents the weight. When the weights are normalized, then $\sum_{i=1}^{n} c_i = 1$ (Abidi & Ong, 2000; Wu et al., 2008).

$$d(X_r, X_s) = \left[\sum_{i=1}^{n} c_i (x_{ri} - x_{si})^2\right]^{1/2} \quad (1)$$

Despite of the advantages of SOM, as other traditional cluster analysis methods, SOM technique does not provide measures for validation of the cluster analysis results (Wang, 2001). It is difficult to find clustering boundaries from the result of SOM. Furthermore, K-means technique is sensitive to the choice of a starting point for partitioning the items into K initial clusters (Chang, Huang, & Wu, 2010; Hosseini, Maleki, & Gholamian, 2010; Kuo, Ho, & Hu, 2002). Due to the weakness of SOM and K-means method, prior literature proposes to adopt a two-staged clustering method (Abidi & Ong, 2000; Chiu, Chen, Kuo, & Ku, 2009; Vesanto & Alhoniemi, 2000). In this regard, this paper applies the K-means technique to find the clustering boundaries from results of SOM. In the first stage, data set is clustered via adopting the SOM to decide the number of data clusters (k). In the second stage, the derived approximation of the clusters (k) determined in the first stage is used with K-means method.

2.3. RFM model

RFM model is a behavior-based model to analyze and then predict customer behaviors based on the past customer behavioral activities in the database (Wei et al., 2010). It consists of three