



Mining customer knowledge for exploring online group buying behavior

Shu-hsien Liao^{a,*}, Pei-hui Chu^b, Yin-ju Chen^a, Chia-Chen Chang^a

^a Department of Management Sciences, Tamkang University, No. 151, Yingjuan Rd., Danshuei Dist., New Taipei City 251, Taiwan, ROC

^b Department of Information Management, National Taipei College of Business, No. 321, Sec. 1, Jinan Rd., Zhongzheng District, Taipei City 10051, Taiwan, ROC

ARTICLE INFO

Keywords:

Data mining
Association rules
Cluster analysis
Online group buying
Online group buying behavior

ABSTRACT

Online group buying is an effective marketing method. By using online group buying, customers get unbelievable discounts on premium products and services. This not only meets customer demand, but also helps sellers to find new ways to sell products sales and open up new business models, all parties benefit in these transactions. During these bleak economic times, group buying has become extremely popular. Therefore, this study proposes a data mining approach for exploring online group buying behavior in Taiwan. Thus, this study uses the Apriori algorithm as an association rules approach, and clustering analysis for data mining, which is implemented for mining customer knowledge among online group buying customers in Taiwan. The results of knowledge extraction from data mining are illustrated as knowledge patterns, rules, and knowledge maps in order to propose suggestions and solutions to online group buying firms for future development.

© 2011 Elsevier Ltd. All rights reserved.

1. Introduction

In these tough economic times, it is not only important to find new sources of income but also to cut down on expenditures. By using online group buying, it is easy to find more people in a short period of time to share freight costs and to buy in bulk so as to lower prices. It is also easier to get bigger discounts when more people take part in a group purchase. On the other hand, online group buying is a model in which multiple buyers cooperate and buy the same good/service in order to bargain with the proprietor, if there are enough buyers, they may aggregate buyer power to get volume discounts. All parties benefit in these transactions. In the past, group buyers were limited to members of companies, friends, families or communities. They filled out the types of goods and quantity of items to be purchased on the flyers to order goods. As the internet develops, it is becoming an increasingly prosperous network for many types of commerce. In addition, the large shopping sites are familiar with online shopping markets and the follow-up group buying platforms are learning this market. They have created group buying discount zones and provided some incentives and discounts to attract more users to visit and buy. The more visitors that come, the more goods are exhibited and sold. Thus, the consumption patterns of group buying have become more active in online shopping markets. According to pollster online survey of group buying, the most preferred goods are foodstuffs, making up to 33%. The group buying shares of other items are: clothing and accessories 11%, cosmetics 8%, articles of daily use 5%, others 3% and home appliances 2%. How-

ever, 36% of people in Taiwan have yet to experience group buying (Market Intelligence & Consulting Institute in Taiwan, 2010).

As online group buying (OGB) market increases and a great variety commodity stats become available, consumer demand is changing fast, implicitly shortening the product life cycle. Clear assessment of the overall sales strategies of internet group buying has a positive effect. However over-reliance can result in the cart coming before the horse. In 2009, as many as 50.3% of online stores did not break even, while 5.3% increased sales compared to last year in Taiwan. The reason is that business operation was impacted by the overall economy. More and more intense price wars led to descending overall profits (Market Intelligence & Consulting Institute in Taiwan, 2010).

In addition, in electronic marketplaces, group buying is seen as an effective form of electronic commerce and a promising field. For example, Tokuro and Takayuki (2004) proposed using decision support systems for buyers in group buying. Their system supports buyers' decision making by using the Analytic Hierarchy Process with three methods for group integration. First, buyers trade in simple group buying. Second, all buyers are integrated. Third, some buyers are integrated. Thus, buyers' multi-attribute utilities are effectively expressed in group integration and buyers can purchase goods at a lower price. Buyers' payments are decided based on their degree of compromise. Software agents can be useful in forming buyers' groups since humans have considerable difficulties in finding Pareto-optimal deals (no buyer can be better without another being worse) in negotiation situations (Frederick & Brahim, 2006). The above study developed a negotiation protocol for software agents, which evaluated whether or not the problem is difficult on average and why. This protocol is probably able to find

* Corresponding author.

E-mail address: michael@mail.tku.edu.tw (S.-h. Liao).

a Pareto-optimal solution and, furthermore, minimize the worst distance to the ideal among all software agents given strict preference ordering. In addition, Miguel and María (2009) explored the circumstances under which the retailers' use of the buying group's brand name may benefit them. Their research findings show that the retailer's use of the buying group's brand name is more capable of improving the retailer's economic satisfaction with the buying group when differentiation is perceived to be a source of competitive advantage, when the environment is perceived as more dynamic and when the retailer is strategically integrated in the relationship with the buying group. However, only a few studies have explored online group buying behavior patterns and segments from customers.

On the other hand, customers play an important role as business assets. Most of the parties involved in sales, such as the commercial web sites, retailers and channels, are aware of the need for businesses to acquire better customer knowledge. However, this is easier said than done since customers' knowledge is concealed within the customers. It is available but not accessible, and there is little possibility of exploring the full volume of data that should be collected for its potential value. Inefficient utilization renders the data collected useless, causing databases to become 'data dumps' (Keim, Pansea, Sipsa, & Northb, 2004). Thus, finding ways to effectively process and use data is an artificial issue that calls for new techniques to help analyze, understand or even visualize the huge amounts of stored data gathered from business and scientific applications (Liao & Chen, 2004). Among the new techniques developed, data mining is a process of discovering significant knowledge, such as patterns, associations, changes, anomalies and significant structures from large amounts of data stored in databases, data warehouses, or other information repositories (Keim et al., 2004). Customer knowledge extracted through data mining can be integrated with products and marketing knowledge from research and can be provided to up stream suppliers as well as downstream retailers. Thus, it can serve as a reference for product development, product promotion and customer relationship management. When effectively utilized, such knowledge extraction can enable enterprises to gain a competitive edge by producing customer-oriented goods that increase consumer satisfaction (Arie & Sterling, 2006; Liao, Chen, Chieh, & Hsiao, 2009; Liao, Chen, & Dang, 2010; Liao, Chen, & Hsu, 2009; Liao, Chen, & Tseng, 2009; Liao, Ho, & Yang, 2010; Liao, Hsieh, & Huang, 2008).

Accordingly, this study investigates online group buying behavior, and implements data mining approach to analyze Taiwanese customers. There are two data mining stages implemented in this study. First, this study employs the *k*-means algorithm to cluster the customers into potential customers and target customers, and uses the Apriori algorithm to generate association rules for each cluster. The rules are proposed to the group buying firms to help them attain possible new customers, services and sales. The rest of this paper is organized as follows. Section 2 introduces the proposed data mining system, which includes the system framework, system design, and physical database design. Section 3 introduces the data mining approach, including the association rules and cluster analysis. Section 4 presents the data mining process and the analyzed results. Section 5 describes research findings, managerial implications. Finally, a brief conclusion is presented in Section 6.

2. Data mining systems

2.1. Research framework

Because online group buying customer information and product sales information are difficult to obtain, this study used a designed

questionnaire to collect research data. This study uses *k*-means to sort customers into clusters to generate association rules for each cluster, and then proposes suggestions and solutions for online group buying to open up possible new services and sales.

2.2. System framework

This study collected the past data of customers to establish a database system. We then analyze the entire database system by data mining to find the association between group buying customer behavior and commodities buying patterns, including consumer shopping preferences and demand consideration, etc. The aim of this approach is to enable businesses to further understand group buying experience/patterns, rather than the psychology and orientation of experienced online group buying customers. The propose is to make suitable marketing suggestions, so that they can really provide customers with preferred products and services, while reducing marketing costs and increasing business profits. The system framework is shown in Fig. 1.

Accordingly, the system design diagram is shown in Fig. 2. It shows that this study incorporates data related to customers, customer behavior and products into the database, and analyzes the entire database by data mining for customer patterns and market segmentations to find the different types of target customers. Online firms can evaluate customer knowledge management for marketing and service, and then determine efficient means to achieve the goals of exploring online group buying behavior.

In this study, the design and operation of a physical database is used to construct a relational database enter data in the table through Microsoft Access 2003. Although general database software cannot accommodate too many people online simultaneously, Microsoft SQL 2005 can satisfy this need, because the general database systems use standard structured query language (SQL). Because each type of data storage and processing is different, in order to give a programming language access to the information database system, manufacturers can design a driver for all types of language using standard SQL, and then access their database through a regional network. Microsoft's console provides an open database link (open database connectivity; ODBC). Thus, administrators can manage a variety of ODBC drivers (Fig. 3).

2.3. Questionnaire design and data collection

This study uses the questionnaire approach to collect data from general customers who have group buying or online group buying experience, and establishes the database system using collected data. The main purpose of the questionnaire design is to understand the customer motivations of the entities involved in group buying, the degree of involvement of internet group buying, and explore the factors which affect the correlation between internet group buying behavior and customer psychology. The questionnaire is divided into five parts. Part 1 focuses on customer personal information (9 items), part 2 discusses the customer psychology of individual customers engaged group buying (9 items), part 3 looks at the customer tendencies of individual online group buying (9 items), while part 4 focuses on the shopping behavior of individual online group buying (4 items) and the service mechanism of online group buying (10 items). The quantity of preliminary draft questionnaire sent and responded to, the pre-test questionnaire and formal questionnaire are shown in Table 1. Thus, the questionnaires were collected from November 1st to November 30th of 2009. Altogether, we sent 720 questionnaires and 621 were collected. Excluding omissions and incomplete answers, there

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات