Mining Customer Shopping Behavior: A Method Encoding Customer Purchase Decision Attitude

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ABSTRACT
Mining customer shopping data is able for business managers to understand and predict customer behavior. However, most practices are focusing on the purchasing goods, i.e. basket analysis. This article collects customer shopping data by observation to systematically discover customer shopping pattern incorporating with customer’s purchasing decision time. With Apriori algorithm and the proposed customer purchasing decision pattern examining principle, customer purchase behaviors of with decision attitudes are revealed. This article gets insights at decomposing support and confidence values of an association rule. With the proposed encoding method, decision attitudes on goods in the association rule can be interpreted.

KEYWORDS
Apriori, Association Rule, Customer Shopping Behavior, Retailing

INTRODUCTION
Service industry is a business that most companies need to directly interact with customers. With the usages of information communication technology (ICT), companies enable to be close to their customers and understand their customers better than ever to promote customer satisfaction and loyalty. ICT adoptions become evitable deeds on service management in the 21st century. As Shahsavaran and Ji (2014) pointed out, ICT has enhanced a great deal of service improvement for service industry such as leveraging the surging river-like word-of-mouth flushed from social communities, or providing innovative and fun services with QR codes, mobile APPs, and augmented reality applications. These innovative applications indeed create high added-values for companies and for customers.

Big data mining nowadays has been widely adopted in businesses. The massive data collected from business transactions have made entrepreneurs realize to use the data for supporting their business decision making. The method mining customer shopping data incorporated with customer purchasing products with price and quantities is generally called market basket analysis. For example, with the usage of customers’ purchase data and the product information, Brijs, Goethals, Swinnen, Vanhoof, and Wets (2000) and Nafari and Shahrabik (2010) mined out the potential customer purchasing behavior for marketing purposes and Liao, Wen, Hsian, Li, and Hsu (2014) evaluated product’s

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future market value. In fact, applying data mining and suitable management method could help mass
customization which is concerned with meeting the needs of an individualized customer market (Tien,
2006; Tirunillai & Tellis, 2014). The famous result is the diaper-beer rule in baskets. Benefits for
retailers are better shelf management, goods supply, and market promotion. However, gaining more
profits is the most important goal for retailers. Oliverira-Castro, Foxall, and Schrezenmaier (2005)
investigated 80 retail shoppers in 16 weeks and found that they are most sensitive to prices of the
goods. Discounts can always arouse customer’s purchase desires on one hand, yet decrease retailer’s
profits on the other. Competition on prices is not the only and final answer. There must are other
factors affecting customer’s decision on purchases.

Except for customer demographics, Foxall (2007) stated that research regarding retail customer
purchase decision better anchors on purchase factors affecting customer’s decision criteria. Besides,
Wells, Chang, Oliverira-Castro, and Pallister (2010) pointed that discovery of customer’s purchase
behavior and decision making contributes to correct market segmentation. For basket analysis, it has
been caught attention by practitioners and researchers are product information such as product category,
price, and quantity, i.e. POS (point of sales) data. However, other customer’s shopping activities,
such as shopping route, decision time of customer’s putting a product into basket and whether the
product is removed from basket, which are incorporated for mining customer shopping behavior
are often neglected and believed by the authors that they can reveal more accurate customer retail
behaviors. Freathy and O’Connell (2002) investigated airport travelers’ sensitivity to time relating
with their observed shopping attitude since the authors think that customers’ purchase behavior
and intention by observation would be more properly collected. Besides, Sinha and Uniyal (2005)
and Tripathi and Tiwari (2015) also studied customer’s in-store shopping manners by observation.
The authors stated that observing customer’s purchasing attitude incorporating with time effect is
an appropriate data collection method. In short, although data analyses have been done on a daily
basis in retail stores and service sectors, based on big data analyzing thinking, there is still a variety
of data facts needed to be collected. Moreover, Mo, Li, Tian, and Tian (2015) mentioned, proper
data encoding and digitalizing human variables would lead to efficient algorithm computation on
solving particular social science problems. In a shopping center, a customer’s decision time to put
a product into her/his basket or the time she/he stalling at a certain product shelf is believed, in this
study, to be an important data for retailers to take concern. The time effect at retailing scenes has
been provided research evidences of influencing shoppers’ purchase decisions. Park, Iyer, and Smith
(1989) have stressed that when shoppers are compressed by shopping time, their product searching
manner and final purchased products, product brands would be different comparing with who are not.
Further, recently, Zushi, Curlo, and Thomas (2009) specified that time can provide an explanation of
customer decision behaviors. Time seems to be a structured data; yet to customers, it is a poly-type
one. McDonald (1994) stated that shopping time is an entire period of a customer taking actions from
product search, delivery, to purchase. During this period, many interventions occur such as receiving
a phone call, being stalled by an advertisement, taking a leave for answering the call of nature etc.
While the duration time of interventions taken accompanied to analyze customer purchase decisions
time, customer retail attitudes and behaviors can be multifold discovered (Nemati, 2003). There
exists a retail store in about every 500 meters in Taiwan’s city areas. According to Huang (2016),
the sales reached $11 billion in July 2016. With this such high rank in the dense of retail stores and
retail consumption potential, Taiwan retailing businesses including many well-known international
retailers such as Carrefour, Costco, 7-ELEVEN, are worthy to study the customer retail behaviors
as well as the research methodology and findings are contributed to the retail business literature and
provide practical implication.

Association rule (AR) data mining is a good scientific tool providing practical basket analysis
implications (Aguinis, Forcum, & Joo, 2013); however according to Shaheen, Shahbaz, and Guergachi
(2013) other than the explicit rule presentation, its further implicit meanings and denotations are still
required researchers to explore. Otherwise, decision-making model of customer shopping have been
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