The AHP Method for the Evaluation and Selection of Complementary Products

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ABSTRACT

This article describes how when having already purchased one product, it is likely that a consumer may look for complementary ones. That is why almost recommender systems integrate modules for managing complementarity between products and services. An Analytic Hierarchy Process (AHP) based model is described in the present paper, whose objective is to help recommend to customers among a set of complementary products the best ones. Selecting the best complementary products is done through an evaluation process of the alternatives according to a number of criteria.

KEYWORDS

Analytic Hierarchy Process, Complementary Recommendation, Product, Recommendation System

INTRODUCTION

While moving toward electronic commerce, companies need to adopt new strategies so as to preserve or improve their positioning (Schafer, Konstan, and Riedl, 2001). Besides, they are able to target new markets and provide customers with more options. As a matter of fact, companies can today gather easily and more accurately a large amount of information about their customers (Michman, Mazze & Greco, 2003). Unfortunately, migration to e-commerce has led to information overload, which raises many problems. On the customer side, there are many alternatives to check if he wants to choose the best one. Indeed, choosing a product to purchase, a movie to watch or even a book or article to read among has become a task that consumes a lot of time and energy (Dabrowski & Acton, 2013). On the marketer side, understanding customers’ expectations and assigning to them appropriate suggestions are such big concerns for them as there is a huge amount of available information on consumers that needs to be properly exploited so as to better understand them and ensure high satisfaction for them (Huang, Chung & Chen, 2004; Kim et al., 2001). Recommender systems RSs are presented as a solution for the discussed problems because they help proposing to the customers complementarity for the products or services they have already purchased. Recommendations are made on the basis of customers’ past purchases (Pazzani & Billsus, 2007) or what similar customers have purchased (Wei, Shaw & Easley, 2002).

Matching customers’ need with recommendations is key success in RSs. Thus, RSs are becoming a core tool for enhancing cross-selling practices as they help focusing marketing efforts not on all the customers but only on those who are more likely to act.
In order to enhance sales and satisfy consumers, e-commerce RSs provide two types of recommendations:

- Complementary Product Recommendations on the basis of cross-selling, up-selling and accessorizing approaches.
- Alternative Product Recommendations providing similar products to the one already bought.

The present paper describes a model for helping consumers with the selection of complementary products CPs. CPs are being evaluated and ranked according to certain criteria. The proposed model uses the Analytic Hierarchy Process, which is a Multiple Criteria Decision Making method (MCDM) for the criteria evaluation and complementary products ranking.

This paper is organized as follows; the next section describes a literature review about recommender systems, cross-selling and complementary product recommendations. The section that follows is dedicated to discussing the implemented method (AHP) and the model structure including the criteria evaluation process and the alternatives evaluation and selection.

LITERATURE REVIEW

Recommender Systems

RSs are decision support systems that help marketers tailor products, services and content to a customer depending on his personal interests and preferences (Liang, Lai, and Ku, 2007). Their use covers almost all fields: tourism (Borràs, Moreno, and Valls, 2014), e-learning (Thai-Nghe et al., 2010), e-commerce (Wei, Shaw & Easley, 2001). In electronic commerce, many large e-commerce sites implement recommender systems to ensure personalized suggestions (Melville & Sindhwani, 2010) for customers about products to purchase (Schafer, Konstan, & Riedl, 1999), movies to watch (Carrer-Neto et al., 2012), music to listen to (Lee, Cho, and Kim 2010), news to read (Claypool et al. 1999) and restaurants to visit (Rust & Kannan 2002). In general, they collect information about customers’ online behaviour and feedback, and then provide suggestions based on their demographics, purchases history, items features, preferences and tastes (Rust & Kannan, 2002; Buder & Schwind, 2012).

The Cross-Selling Concept

Cross-selling means two concepts: providing existing customers with similar products and services (Ngobo, 2004) or with complementary products to the ones they have already purchased. Cross-selling has become a common marketing practice in many industries (Malm, 2012) since it helps create more value for both supplier and customers. Cross-selling help companies to have stable business growth rates, which are achieved through a stronger customer ties, decreased customer churn rate and a sustainable competitive advantage. Studies have shown that adopting cross-selling strategies gives companies the opportunity to increase the revenue contribution from their existing customers (Kumar, George, and Pancras, 2008). On the other hand, it enhances customer retention since customer switching costs increases with increased cross buying (Kumar, George, and Pancras, 2008). In (Reinartz & Kumar, 2003), the authors showed that cross selling help increase customers profitability and lifetime value, which in turn, leads to higher share of wallet and higher revenues (Netessine, Savin, and Xiao, 2006).

Many RS enhance cross selling by analysing the history of the customers’ online activity in order to provide them with items they would need or desire. Making decision about complementary products/services to recommend differs from one customer to another and depends on different criteria. Some consumers tend to prefer products with high quality whereas others are interested on the price more than other criteria. Studying those factors and identifying the importance of one factor
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