Chapter 62
Archetypal Personalized Recommender System for Mobile Phone Users

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ABSTRACT

The process of mobile phone selection, for several reasons, depends on a number of common individual features possessed by the manufacturers. The recent advance in these products' functionalities is identified as a key factor for the growing number of brands and models that compete in its fierce market and thus leads to the problem of product selection. Product comparisons, as a result, are becoming more difficult thus favoring the use of computer-based decision systems to assist consumers in scouting for information on mobile products that can best satisfy their needs. This study proposes an archetypal personalized recommender system that can intelligently mine information about the features of mobile phones and provides professional services to potential buyers. Consumer preferences and product features are technically expressed with the aid of Triangular Fuzzy Numbers while Fuzzy Near Compactness is employed to measure the feature-need similarities in order to recommend optimal products that best satisfy the needs. Finally, an experimental study is performed to examine the feasibility and effectiveness of the proposed system.

1. INTRODUCTION

Mobile phone penetration has been found to be distinctively above 80% in many developing countries hence found as devices recently evolved into permanent companions of the inhabitants of such countries. In some regions, such as Taiwan and Hong Kong, the penetration has been found very close to 100% (NCC, 2010). As these devices become increasingly indispensable in everyday life, the number of users worldwide grew from 170 million in 1996 to 2.5 billion in 2006 at an average growth rate of 230 million users per year (Pyramid Research, 2006).

The rapid expansion in the varieties of mobile products has contributed greatly to the product's enormous search space which, in effect, has made manual product selection time-consuming and difficult for consumers (Ahn, 2006). Recently, mobile phones provide extended functionalities which play vital roles in the selection of such product. Analysis of consumer behavior can identify salient preferences for expectation about design, functionality, features, appearance, and price (Eno, 2012). Mobile phone selection can be formulated as a Multiple Criteria Decision Problem (MCDP) because the selection is based on a set of variables that makes such decision complex (Mc-Crimmon, 1973).

All mobile phones have a number of features in common, but manufacturers also try to differentiate their own products by implementing additional functions to make them more attractive to consumers. This has led to great innovation in mobile development over the past 20 years (wikipedia.org). This growing number of brands and models of mobile phones compete in the fierce market on the basis of innovation, design and advanced functionality. Despite the present commonality of mobile products and evolution of selection techniques, most consumers are still found to be skeptical while pursuing many of such products online (Chen et al., 2010). As a result, product comparisons by consumers are becoming difficult thus favoring the use of computer-based decision systems to assist consumers in finding what they need or want.

The tremendous growth and usage of information has led to the problem of information overload in which users find it difficult to locate the right information at the right time (Resnick et al., 1994). Also, the increasing information from Internet market and electronic commerce along with the rapid expansion of business websites results in information overload that is full of uncertainty (Cao & Li, 2007). Recently, consumers spend more time surfing the Internet for needed information while enterprises often find it difficult to identify their consumers' interests.

The explosive growth of the World Wide Web and the emergence of e-commerce have led to the development of recommender systems. Personalized information filtering techniques are used to identify the set of items that will be of interest to a certain user. With the growing penetration of the Internet and e-commerce, personalized recommendation techniques that can appropriately identify products or services for customers so as to face the seemingly inevitable challenges that result from information overload are increasingly becoming critical (Chen et al., 2010).

Recommendations are a part of everyday life such that any individual can constantly receive recommendation for certain products from friends, family, sales people and internet resources. This is to make the most informed possible choices about decisions in our daily selections. There are many factors that influence humans' decisions, for instance, when buying a flat screen TV, he may want to have one with the best resolution, size, refresh rate for the memory, and other features. All these factors are carefully analyzed in order to arrive at an optimal decision.

Recommender Systems apply data analysis techniques to help customers find products that are likely of relevance. Collaborative Filtering and Content Based Filtering are found in vogue today (Resnick et al., 1994; Schardamand & Maes, 1995). Collaborative filtering approaches build a model from a user's past behavior by using the items that were previously purchased or selected by other users of the product. These behaviors are numerically represented and rated in order to find the association that could exist between a current user and the items (Resnick & Varian, 1997). This technique is also regarded as prediction model for commonly purchased items as any user is assumed to be interested in it (Melville & Sindhwani, 2010). Content based filtering approaches often match the attributes of available items with the characteristics of a user (Melville et al., 2002). The technique also utilizes series of discrete characteristics inherent to the item so as to

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