Personalized Hybrid Book Recommender

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ABSTRACT

Personalized Recommendation Systems (RS) provide end users with suggestions about items that are likely to be of their interest based on users’ details such as demographics, location, time, and emotion. In this article, a Personalized Hybrid Book Recommender (PHYBR) is presented, which integrates personality traits with users’ demographic data and geographical location to improve the quality of recommendations. The Ten Item Personality Inventory (TIPI) was used to determine users’ personality traits. PHYBR was evaluated using two metrics, that are, Standardized Root Mean Square Residual (SRMR) and Root Mean Square Error of Approximation (RMSEA). Both metrics revealed PHYBR outperforms the baseline models (without considering personality traits and geographical location factor) in terms of the recommendation accuracies. This study shows that users who are in the same geographical contexts intend to have similar preferences. Therefore, users’ personality details along with their geographical locations can be used to provide improved personalized recommendations.

KEYWORDS

Age, Big Five, Collaborative Filtering, Content-Based Filtering, Gender, Location, Personality, Recommendation System

1. INTRODUCTION

With the growing penetration of the Internet and e-commerce, personalized recommendations that identify appropriate products or services for customers to reduce their information load and cost of searching become increasingly critical. Many online vendors, including Amazon and Netflix, have implemented Recommendation Systems (RSs) to assist their consumers (Chen et al., 2010). However, central to the development of an effective RS is identifying customer preferences, which can be analyzed by various criteria such as customer browsing behavior, personality or purchasing history (Adomavicius & Tuzhilin, 2005).

RSs normally acquire data about user’s activities and build user models to filter the preferences expressed either explicitly (observing rating or wish list) or implicitly (monitoring user’s behavior such as websites visited, songs heard and books read) (Núñez-Valdés et al., 2012). The recommender technology is superior to other information filtering applications because of its ability to provide personalized and meaningful information recommendations. For example, while standard search engines are very likely to generate the same results to different users entering identical search queries,
RSs are able to generate personalized results which are more relevant to the user as they take each user’s personal interests into account (Gavalas et al., 2014).

As users of RSs may have different needs in various situations and contexts, it is becoming increasingly important to consider contextual data when filtering information (Hawalah & Fasli, 2014). This resulted in the birth of personalized recommendations, focusing on various user contexts such as time of access (Wang & Shao, 2004), location of access (Braunhofer et al., 2014; Huang, 2016; Liu et al., 2013) and emotion/mood (Shan et al., 2009). For instance, studies have shown significant correlations between personality and people’s tastes and interests. For example, Cantador et al. (2013) revealed similar personality traits between users who like science-fiction and comic books. Similarly, those who like self-help books show strong personality resemblance to those who like mystery books. A more recent study used users’ Facebook profiles to determine their personality traits in order to help improve book recommendations (Bhosale et al., 2017). Pera et al. (2011) on the other hand, developed a book recommender based on social interactions and personal interests to suggest books to users. Zhang et al. (2013) combined users’ virtual ratings and real ratings to improve recommendation accuracy using the Amazon book dataset. The relationship between users’ implicit tastes (i.e. what the user likes) and products’ inherent properties (i.e. what the book is about) was examined to improve book recommendations in McAuley and Leskovec (2013). Finally, Chen (2013) developed a mobile location-aware book RS that uses map navigation to recommend books to learners within a real-library environment.

Previous studies have also focused on other factors or contextual features to provide improved personalized recommendations, such as emotion or mood to recommend movies or music (Kim et al., 2015; Shan et al., 2009; Winoto & Tang, 2010), user location and preferences for travel recommendations (Braunhofer et al., 2014; Kim et al., 2015; Koceski & Petrevska, 2012), etc. The use of contextual features for personalized recommendations has showed promising results, however, studies integrating these features to improve recommendation accuracy are scarce. In fact, existing studies tend to favor a specific domain for identified features, for example, mood, time and emotion are often explored in music/movie domain, whereas location in tourism. Contextual features need not be domain specific as shown by Cantador et al. (2013), where correlations were found between users’ personality traits across multiple domains. For example, users who scored high on Openness (i.e. personality) prefer educational books and country music. This suggests that a feature that is used to determine users’ preferences for product A, can be used to determine their preference for product B.

The main aim of using personalization techniques is to generate customized recommendations based on user preferences and interests (Gavalas et al., 2014; Gao et al., 2010), therefore it can be advantageous to incorporate several contextual features in the recommendation process. Unfortunately, very few RSs consider hybrid-features during recommendation. For example, Asabere et al. (2017) integrated social and personality behaviors of users by utilizing their personality characteristics together with their social ties to improve recommendation accuracy. Other examples include the works of Liu et al. (2015), Shen et al. (2016) and Zhang et al. (2017). The scarcity of such studies motivates our study here.

1.1. Research Questions and the Design Theory

1.1.1. Objectives and Research Questions

The study aims to extend the literature by addressing the above-mentioned gaps by proposing a personalized RS that integrates several user features in order to improve the recommendation accuracy. The RS was tailored to support book recommendations; hence, it is aptly named as Personalized Hybrid Book Recommender (hereinafter referred to as PHyBR). The specific objectives and their respective research questions (RQ) are as follows:
The Role of Website Features in Creating Loyalty: The Mediating Effect of Commitment
www.igi-global.com/article/the-role-of-website-features-in-creating-loyalty/101790?camid=4v1a

How to Market OR/MS Decision Support
www.igi-global.com/chapter/market-decision-support/42641?camid=4v1a