Providing Personalized Services to Users in a Recommender System

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ABSTRACT

Instructors recommend learning materials to a class of students not minding the learning ability and reading habit of each student. Learners are finding it problematic to make a decision about which available learning materials best meet their situation and will be beneficial to their course of study. In order to address this challenge, a new e-learning material recommender system that is able to recommend quality items to learners individually is required. The aim of this work is to develop a Personalized Recommender System that switches between Content-based and Collaborative filtering techniques, with an objective to design an algorithm to recommend electronic library materials, as well as personalize recommendations to both new and existing users. Experiments were conducted with evaluations showing that the recommender system was most effective when content-based filtering and collaborative filtering were used to recommend items for new users and existing users respectively, and still achieve personalization.

Keywords: *Collaborative Filtering, Content-Based Filtering, Hybrid Recommendation, Personalization, Recommender System, Similarity*

INTRODUCTION

Knowledge, they say, is light, and it is acquired through learning. During formal learning, learners are expected to acquire knowledge in school from the primary level to the tertiary level, and at this stage learning becomes more complex. University students find it difficult to choose books and other learning materials for the courses they registered for. Year in year out, they have to rely on their lecturers' recommendations, friends' suggestions and predecessors' advice. However, most of the students end up confused and overwhelmed with the type of learning materials they are presented with, as such materials might not suit their learning style or necessarily add to their knowledge about a course. A Recommender system is a type of information filtering system that gives advice on products, information, or services that a user

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may be interested in. It assists users with the decision making process when choosing items with multiple alternatives (Werthner, Hansen, & Ricci, 2007). A recommendation system can aid students in choosing their learning materials by determining which items they would have rated the highest based on personal criteria and correlation with other students.

Recommender systems are mostly built by using either a collaborative filtering or a content-based filtering technique. Collaborative filtering approaches build a model from a user's past behaviour as well as similar decisions made by other users, and use that model to predict items that the user may have an interest in Prem & Vikas (2010). In contrast, content-based filtering uses features of items to infer recommendations. Items with similar content to the current viewing item will be recommended to the active user (Felferning, Friedrich, & Schmidt-Thieme, 2007).

Due to the fact that most of the existing recommender systems give similar predictions to new users of such systems, our new recommender system will be personalized such that electronic library materials like e-books would be recommended to each individual by taking his/her learning style and habit into consideration. It is able to achieve this by using both content-based filtering and collaborative filtering techniques to produce a recommendation to new users and existing users respectively.

RELATED WORK

The current generation of recommendation methods can be classified into: Content-based Recommendations, Collaborative Recommendations, Knowledge-based Recommendations, Demographic Recommendations and Hybrid Recommendation.

Collaborative filtering (CF) is a common Web technique for generating personalized recommendations. Examples of its use include Amazon, iTunes, Netflix, LastFM, StumbleUpon, and Delicious, which are websites offering various multimedia services (Hoppe, 2009).While being the most successful recommendation technique to date (Resnick et al., 1994), it has difficulty dealing with new users. This is because there needs to be some correlation or better still, relationship among existing users. On the other hand, pure content-based recommendations ignore the preferences of other users (Schein, Popescul, & Ungar, 2002). Therefore, items that contain terms that relate well to the search and which are statistically less likely to be common are suggested first (Adomavicius & Tuzhilin, 2005). However, content-based filtering techniques are known to have issues involving limited content data and information, and concentration on bounded data. Knowledge-based recommendation gain leverage on recommendation tasks by using explicit models of both the user of the system and the products being recommended (Towle & Quinn, 2000). Demographic Recommendations categorizes the user based on personal attributes and makes recommendations based on demographic classes, e.g. college students, teenagers, women, men, etc. Grundy's system (Guttman et al., 1998) is an example of a demographic filtering recommender system which recommended books based on personal information gathered through an interactive dialogue. A Hybrid recommendation system combines two or more recommendation techniques to gain better system optimization and fewer of the weaknesses of any individual ones (Prasad & Kumari, 2012). Such combination could be: Weighted, Switched, Featured, Cascaded, Augmented, Levelled or Mixed.