Chapter 34 Recommender Technologies and Emerging Applications

Young Park

Bradley University, USA

ABSTRACT

This chapter presents a brief overview of the field of recommender technologies and their emerging application domains. The authors explain the current major recommender system approaches within a unifying model, discuss emerging applications of recommender systems beyond traditional e-commerce, and outline emerging trends and future research topics, along with additional readings in the area of recommender technologies and applications. They believe that personalized recommender technologies will continue to advance and be applied in a variety of traditional and emerging application domains to assist users in the age of information overload.

INTRODUCTION

A recommender system (or recommendation system) is a software application that provides users with personalized recommendations of goods, services or other potentially relevant and interesting information, and thus helps users find useful items in the information overload (Aggarwal, 2016; Resnick & Varian, 1997; Ricci, Rokach, & Shapira, 2015). The field of recommender systems is highly interdisciplinary and based on various technologies. Though relatively new, recommender technologies have made significant progress for the last decade.

A variety of recommender systems have been developed and used mainly in e-commerce application domains, including Amazon.com, BarnesandNoble.com, Netflix.com, mystrands.com, and Yahoo. com (Konstan et al., 1997; Sarwar, Karypis, Konstan, & Riedl, 2000; Schafer, Konstan, & Riedl, 2001). Over the last decade, recommender systems have proven very useful in increasing sales and retaining consumers, and are considered an effective personalization tool in the e-commerce environment (Adomavicius & Tuzhilin, 2005; Goy, Ardissono, & Petrone, 2007; Jannach, Zanker, Felfernig, & Friedrich, 2011; Ricci et al., 2015; Sarwar et al., 2000; Schafer et al., 2001;). One illustration is the famous Netflix competition (2006-2009), which offered a one million dollar prize in exchange for an algorithm to enhance the recommendation accuracy (i.e., movie rating prediction) of its recommender systems (Bell, Koren, & Volinsky, 2010).

DOI: 10.4018/978-1-5225-7598-6.ch034

This chapter presents an overview of the field of recommender technologies and their emerging application domains. We characterize current major recommender system approaches in a unifying model and describe emerging applications of recommender technologies beyond traditional e-commerce. We conclude with emerging and future trends and topics, as well as additional readings in the area of recommender technologies and applications.

BACKGROUND

Since the first major recommender systems emerged in the mid-1990s (Resnick & Varian, 1997), a large number of recommender systems have been developed and used in a wide range of e-commerce environments and improved by continuing research.

A typical recommender system provides users with *personalized* recommendations of items such as goods, services or information to guide users to find items that are relevant to them. Recommendations are based on past and present profiles of users with respect to items. The *personalized recommendation problem* can be described as follows:

Given a target user, produce personalized recommendations of items relevant to the target user.

To solve this recommendation problem, a recommender system generally uses three types of data data about the users (U_data), data about the items such as goods, services or information (I_data), and data about the relevance (such as rating, evaluation, purchase, or interest) relation between the users and the items (R_data):

- *U_data* contains a set of all users and some optional additional information about all users.
- *I_data* contains a set of all items and some optional additional information about all items.
- *R_data* contains relevance information (such as rating, evaluation, purchase, or interest) of the item to the user. Such information can be viewed and represented as a partial function (or matrix) that maps a pair of user and item into a relevance value.

As shown in Figure 1, a recommender system can be modeled as follows:

Given a target user, a recommender system recommends a list of new items that are most relevant to the target user by using U_data, I_data, and R_data.

The user data is constructed for all existing users and the item data is constructed for all existing items. The user-item relevance data is constructed over time and can be obtained either explicitly from user participation (*explicit relevance feedback*), inferred implicitly from user behavior (*implicit relevance feedback*), or both.

In order to find items that are relevant to the target user, recommender systems are premised on the *similarity* between users or between items. A number of similarity metrics are used to represent the degree of similarity between users or items. *Pearson Correlation* and *Cosine Similarity* are among most widely used metrics in recommender systems.

11 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: <u>www.igi-global.com/chapter/recommender-technologies-and-emerging-</u> applications/214635

Related Content

Challenges for Big Data Security and Privacy

M. Govindarajan (2019). Advanced Methodologies and Technologies in Network Architecture, Mobile Computing, and Data Analytics (pp. 57-66). www.irma-international.org/chapter/challenges-for-big-data-security-and-privacy/214604

Research on Double Energy Fuzzy Controller of Electric Vehicle Based on Particle Swarm Optimization of Multimedia Big Data

Xiaokan Wang (2017). International Journal of Mobile Computing and Multimedia Communications (pp. 32-43).

www.irma-international.org/article/research-on-double-energy-fuzzy-controller-of-electric-vehicle-based-on-particleswarm-optimization-of-multimedia-big-data/188622

An End-to-End Network Evaluation Method for Differentiated Multi-Service Bearing in VPP

Wanqiao Wang, Jian Su, Hui Zhang, Luyao Guan, Qingrong Zheng, Zhuofan Tangand Huixia Ding (2024). International Journal of Mobile Computing and Multimedia Communications (pp. 1-16). www.irma-international.org/article/an-end-to-end-network-evaluation-method-for-differentiated-multi-service-bearing-invpp/340381

An Integrated Approach for the Enforcement of Contextual Permissions and Pre-Obligations

Yehia Elrakaiby, Frédéric Cuppensand Nora Cuppens-Boulahia (2013). *Contemporary Challenges and Solutions for Mobile and Multimedia Technologies (pp. 107-126).* www.irma-international.org/chapter/integrated-approach-enforcement-contextual-permissions/70811

Commanding the Cloud by Moving a Camera Phone

Lambert Spaanenburg, Dalong Zhang, Miao Chenand Andreas Rossholm (2010). *International Journal of Handheld Computing Research (pp. 72-86).*

www.irma-international.org/article/commanding-cloud-moving-camera-phone/46088