Personalized Recommendation:
Approaches and Applications

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INTRODUCTION

Electronic business (e-business) uses information and communication technologies to conduct many activities of a traditional business process. E-business is usually done through the Internet and intranets. As a part of e-business, electronic commerce (e-commerce) is the process of buying and selling goods and services. E-commerce evolved to deal with all types of business interactions, including those between businesses and consumers (B2C e-commerce) and between consumers (C2C e-commerce). E-commerce, which typically uses the World Wide Web (the Web) on the Internet, has grown exponentially. With the explosive growth of goods and services available on the Web through e-commerce, it has become increasingly difficult for consumers to find and purchase the right products or services.

Recommender Systems (RS) provide consumers with personalized recommendations of goods or services, and thus help consumers find relevant goods or services in the information overload (Resnick & Varian, 1997). Since it was first introduced in the mid-1990s, a variety of recommender systems have been developed and used in a variety of e-commerce application domains, including Amazon.com, BarnesandNoble.com, Netflix.com, mystrands.com, and Yahoo.com (Konstan, Miller, Maltz, Herlocker, Gordon & Riedl, 1997; Sarwar, Karypis, Konstan & Riedl, 2000; Schafer, Konstan & Riedl, 2001). Over the last decade, recommender systems have been proven useful in increasing sales and retaining consumers, and are considered as an effective personalization tool in the e-commerce environment (Sarwar, Karypis, Konstan & Riedl, 2000; Schafer, Konstan & Riedl, 2001; Adomavicius & Tuzhilin, 2005; Goy, Ardissono & Petrone, 2007; Jannach, Zanker, Felfernig & Friedrich, 2011; Ricci, Rokach, Shapira & Kantor, 2011).

The concept of recommender systems is interdisciplinary and based on various technologies. Though relatively new, recommender technologies have made significant progress. In this article, we present a brief overview of the field of personalized recommendations and recommender systems in the context of e-commerce. First, we characterize the personalized recommendation problem and present a unifying model of recommender systems. We then examine current major approaches to personalized recommendations within this unifying model and the applications of personalized recommendations. We conclude with emerging and future research trends and additional readings in the area of recommender systems.

Personalized Recommendation Model

The first major recommender systems emerged in the mid-1990s (Resnick & Varian, 1997). Since then, a variety of recommender systems have been developed and used in a range of e-commerce environments, and improved by continuing research. A typical recommender system provides consumers with

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personalized recommendations of goods or services in order to help consumers find the goods or services that are relevant to them. The recommendations are based on past and present profiles of consumers with respect to the goods or services.

Figure 1 depicts a model of personalized recommendation. The *personalized recommendation problem* is described as follows:

Given a target consumer, produce personalized recommendations of goods or services for the target consumer.

To solve this recommendation problem, a recommender system generally uses three types of data — data about the consumers (called *C_data*), data about the items such as goods and services (called *I_data*), and data about the feedback (such as rating, evaluation, purchase, or interest) relation between the consumers and the items (called *F_data*):

- *C_data* contains a set of all consumers and optionally some additional information about all consumers.
- *I_data* contains a set of all items and optionally some additional information about all items.
- *F_data* contains information about feedback (such as rating, evaluation, purchase, or interest) of the consumers on the items (that can be viewed and represented as a partial function that maps a pair of consumer and item into a feedback value).

Thus, a recommender system can be modeled as follows:

Given a target consumer, a recommender system suggests a list of new items that are most relevant to the target consumer by using C_data, I_data, and F_data.

Figure 1. A personalized recommendation model
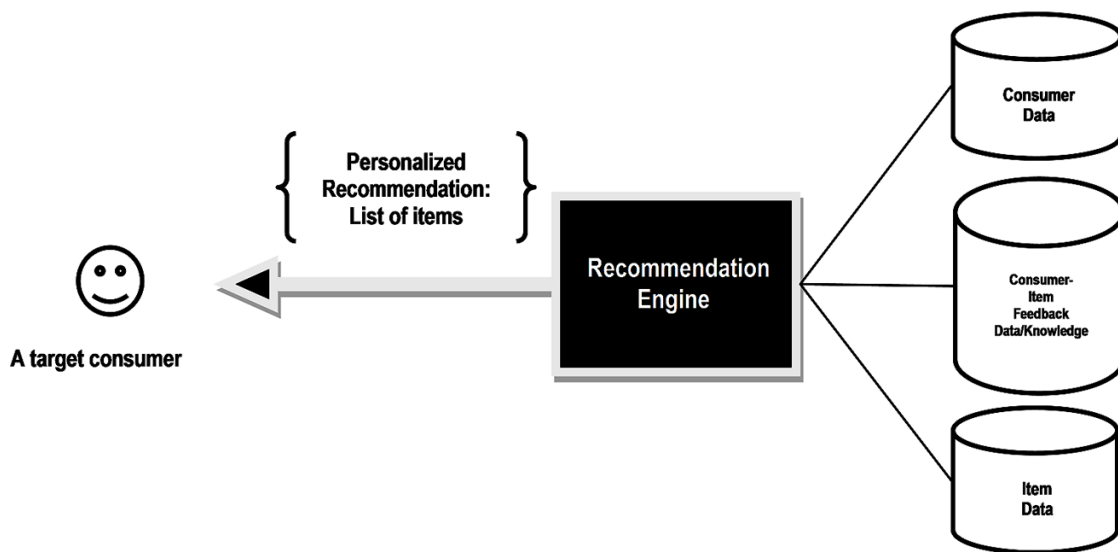
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