Chapter 3
Introduction to Recommender Systems

François Fouss
Facultés Universitaires Catholiques de Mons (FUCaM), Belgium

ABSTRACT

Recommender systems try to provide people with recommendations of items they will appreciate, based on their past preferences, history of purchase, and demographic information. This chapter (1) introduces recommender systems, classifying them along four dimensions (i.e. the way the preferences are gathered, the used approach, the type of algorithm, and the way the results are provided) and describing recent work done in the area, and (2) provides more details about one such type of recommender systems, namely collaborative-recommendation systems. Such systems work by analyzing the items previously rated by all the users and are not based on the content of the items, as content-based systems.

INTRODUCTION

Recommender systems try to provide people with recommendations of items they will appreciate, based on their past preferences, history of purchase, and demographic information. Recommender systems have their origin (see the survey of the state-of-the-art of Adomavicius and Tuzhilin (2005) for more details) in the work done in, mainly, machine learning, information retrieval (Salton, 1989), cognitive science (Rich, 1979), forecasting theories (Armstrong, 2001), marketing (Lilien, Smith & Moorthy, 1992), management (Murthi & Sarkar, 2003), and emerged as an independent research area in the mid-1990s, with the first papers on collaborative filtering (Hill, Stead, Rosenstein & Furnas, 1995; Resnick, Neophytos, Mitesh, Bergstrom & Riedl, 1994; Shardanand & Maes, 1995).

Three steps usually are common to the functioning of recommender systems:

1. Gather valuable information on the users (past preferences, demographic information, etc.) and on the items (description, keywords, etc.).
2. Determine patterns from these historical data.
3. Suggest items to people.

**TYPOLOGY OF RECOMMENDER SYSTEMS**

Many different ways have been developed to achieve the final goal of making recommendations to persons. This section reviews the main features of recommender systems:

1. Related to the first step, the way the preferences are gathered is described in the Section “Preference Indicators”.
2. Related to the second step, various ways developed to extract new information from data are analyzed. Finding new information depends on two axes, the first one describing the global approach (content-based or collaborative approaches in the Section “Filtering Approach”), while the second one describes the type of algorithm (memory-based or model-based algorithms in the Section “Recommendation Algorithm”).
3. Related to the third step, the two possibilities existing for providing results to a user are introduced in the Section “Prediction or Recommendation”.

**Preference Indicators**

The goal of a recommender system is to suggest new items or to predict the degree of linking of a particular item to a specific user, based on historical information (about both users and items). In a typical recommender system, each user has a list of items about which he/she has expressed opinions. The main types of preference indicators expressing user opinions (see (Marlin, 2004) for more details) are numerical rating triplets and co-occurrence pairs:

- a rating triplet has the form \((u, i, r)\) where \(u\) corresponds to a particular user, \(i\) to a particular item, and \(r\) to the rating provided by the user \(u\) to the item \(i\) (e.g. on a scale from 1 to 5);
- a co-occurrence pair has the form \((u, i)\) where, again, \(u\) corresponds to a particular user and \(i\) to a particular item. The occurrence of the pair \((u, i)\) means that user \(u\) rated, liked, viewed, or purchased item \(i\).

Another distinction about preference indicators, highlighted in several works such as (Marlin, 2004), is whether they are explicitly provided by the user (usually a rating following a predefined scale) or implicitly gathered when the user performs specific tasks such as browsing an Internet site (by analyzing timing logs, by mining Web hyperlinks, etc.).

Explicit preference indicators are, for example, obtained by:

- asking a person to rate an item on a predefined scale;
- asking a person to rank a set of items (his or her favorite is ranked first, his/her least preferred is ranked last);
- asking a person to choose the item he or she prefers when showing him/her two or more items;
- asking a person to list items he or she likes.

Implicit preference indicators are, for example, obtained by:

- observing the items that a person views in on-line shopping;
- saving details about the items a person liked in on-line shopping;
- saving a list of items that a person has listened to or watched on his or her computer.

Claypool, et al. (2001) suggest that a more clever method than using explicit ratings should
Related Content

Ecologies of Information and Communication Technology Platform Design for e-Government Service Provision: Actors, Influences, and Fields of Play
www.igi-global.com/chapter/ecologies-of-information-and-communication-technology-platform-design-for-e-government-service-provision/140703?camid=4v1a

Engaging and Supporting Students in Exploratory and Collaborative Activities: The Use of e-ECLip and ACT Environments in Learning Programming
www.igi-global.com/article/engaging-supporting-students-exploratory-collaborative/73659?camid=4v1a

A Collaboration Model: A Service Selection Mechanism to Support Companies’ Interoperability
www.igi-global.com/article/a-collaboration-model/143887?camid=4v1a

Government Funding of E-collaboration Research in the European Union: A Comparison with the United States Model
www.igi-global.com/article/government-funding-collaboration-research-european/1959?camid=4v1a