

A Survey on Recommendation System

linzinan

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1 Traditional Recommendation System

In this part, we describe the traditional recommendation system, such as content-based recommender systems, collaborative filtering(CF) recommender system, and hybrid recommender system

1.1 Content-based Recommender System

Content-based recommender systems utilize the contents of items and finds the similarities among them. After analyzing sufficient numbers of items that one user has already shown favor to, the user interests profile is established. Then the recommender system could search the database and choose proper items according to this profile.

The difficulty of these algorithms lies in how to find user preferences based on the contents of items. Many approaches have been developed to solve this problem in areas of data mining or machine learning. For example, in order to recommend some articles to a specific reader, a recommender system firstly obtains all the books this reader has already read and then analyzes their contents. Key words can be extracted from the text with help of text mining methods, such as the well-known TF-IDF. After integrating all the key words with their respective weights, a book can be represented by a multi-dimensional vector. Specific clustering algorithms can be implemented to find the centers of these vectors which represent the interests of this reader.

1.2 Collaborative Filtering Recommender System

Collaborative Filtering (CF) has become one of the most influential recommendation algorithms. Unlike the content-based approaches, CF only relies on the item ratings from each user. It is based on the assumption that users who have rated the same items with similar ratings are likely to have similar preferences. Collaborative filtering recommends item based on the interest of other like-minded users or identify items similar to those previously rated by the target user. It uses statistical techniques to find the similarity between the user or item vector. CF methods can be classified into two categories Memory-Based and Model-Based.

1.3 Hybrid Recommend System

Hybrid recommendation systems are divided into monolithic hybrid recommendation, parallel hybrid recommendation, and pipeline hybrid recommendation. Monolithic hybrid recommendation is a hybrid recommendation method that integrates several recommendation strategies into one algorithm. The remaining two hybrid recommendations require at least two different recommendation methods and then combine them. According to the input, the parallel hybrid recommendation operates independently of each other, respectively generating a recommendation list, and then the output data is combined into the final recommendation set. The pipeline hybrid recommendation connects multiple recommender systems in pipelined architecture, with the output of the previous recommender system becoming the input portion of the latter recommender system. Of course, the latter recommendation unit can also choose to use part of the original input data.

Hybrid recommender systems are used either to leverage the power of multiple data sources or to improve the performance of existing recommender systems within a particular data modality. An important motivation for the construction of hybrid recommender systems, such as collaborative filtering-based, content-based methods, have different strengths and weaknesses. Some recommender systems work more effectively at cold start, whereas others work more effectively when sufficient data are available. Hybrid recommender systems attempt to leverage the complementary strengths of these systems to create a system with greater overall robustness.