Explicit Factor Models for Explainable Recommendation

YUE ZHANG, University of Virginia
BOHAN HU, University of Virginia

CCS Concepts:
- Information systems → Recommender systems;

Additional Key Words and Phrases: Personalized Recommendation, phase-level sentiment analysis, matrix factorization, explicit factor model, latent factor model

ACM Reference format:
DOI: 0000001.0000001

1 MOTIVATION

Recommendation system is a popular topic in the field of information retrieval. An explainable recommendation system means when generating personalized recommendations, the system also explains why the user might have interests in the recommended items. Some research indicates that customers are more satisfied with recommendations together with explanations[7]. While traditional recommendation algorithms like Latent Factor Models (LFM) works well in terms of prediction accuracy[1], their utilization of latent features limits the explainability of their recommendations. Intuitively, it is desired that a recommendation system could extract a user’s explicitly preferred features from his past textual reviews and give both recommendations and explanations to users based on these features. Thus, we would like to implement the Explicit Factor Model (EFM)[8] to make personalized explainable recommendation for Amazon users, and build an offline website for demonstration.

2 RELATED WORK

In recent years, Latent Factor Models (LFM) have achieved state-of-the-art performance in terms of personalized recommendation. Based on Matrix Factorization (MF) techniques[1], latent factors in user-item matrices could be extracted and utilized for making rating predictions and generating recommendations. However, this approach makes it difficult to interpret reasons behind recommendations because of the implicitness and complexity of latent factors.

Fortunately, new techniques in Sentiment Analysis (SA) make it possible to extract explicit product features from textual reviews wrote by a user, and further analysis the users attitude towards those features[2][9]. With both MF techniques and the explicit factors available, we will combine implicit and explicit factors together to build an accurate and explainable recommendation system[8].

There are also other approaches for explainable recommendations. Topic discovery method[3][6], for example, applies topic models to user reviews and estimates users preferences from topics he mentioned to make
explainable predictions. However, the sentiment a user expresses towards a topic could be positive or negative, and simple topic level analysis will ignore this information and make the prediction inaccurate. In the contrast, the method used in this project will utilize phrase-level sentiment analysis to eliminate this inaccuracy[8].

3 APPROACH

3.1 Dataset

In this project we will utilize the Amazon product dataset[5][4]. The complete dataset contains product reviews and metadata from Amazon, including 142.8 million reviews spanning May 1996 to July 2014. For simplicity and effectiveness, we will only use a dense subset in which each of the remaining users and items have a minimum of 5 reviews each.

3.2 Task Management

The whole project will be decomposed into following sub-tasks.

- Data processing and lexicon construction.
- Matrices construction and model learning.
- Model evaluation.
- Demo website development for system demonstration.

For the first three sub-tasks, we expect each of them to be accomplished within one and a half weeks. The estimated time for the last sub-task will be two weeks.

4 EXPECTED RESULTS

Models learnt for recommending different categories of products should be preserved. Model evaluations should be conducted and results should be discussed. A demo website should be built to demonstrate functions such as top-k recommendation with explanations, product feature visualization and dis-recommendation with explanations.

REFERENCES