Probabilistic Memory-based Collaborative Filtering

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Abstract:

Memory-based collaborative filtering (CF) has been studied extensively in the literature and has proven to be successful in various types of personalized recommender systems. In this paper we develop a probabilistic framework for memory-based CF (PMCF). While this framework has clear links with classical memory-based CF, it allows us to find principled solutions to known problems of CF-based recommender systems. In particular, we show that a probabilistic active learning method can be used to actively query the user, thereby solving the "new user problem". Furthermore, the probabilistic framework allows us to reduce the computational cost of memory-based CF by working on a carefully selected subset of user profiles, while retaining high accuracy. We report experimental results based on two real world data sets, which demonstrate that our proposed PMCF framework allows an accurate and efficient prediction of user preferences.

Index Terms:

Collaborative filtering, recommender systems, profile density model, active learning, data sampling.