Preface

Recent advances in electronic media and computer networks have allowed the creation of large and distributed repositories of information. However, the immediate availability of extensive resources for use by broad classes of computer users gives rise to new challenges in everyday life. These challenges arise from the fact that users cannot exploit available resources effectively when the amount of information requires prohibitively long user time spent on acquaintance with and comprehension of the information content. Thus, the risk of information overload of users imposes new requirements on the software systems that handle the information. Such systems are called **Recommender Systems** (RS) and attempt to provide information in a way that will be most appropriate and valuable to its users and prevent them from being overwhelmed by huge amounts of information that, in the absence of RS, they should browse or examine.

In this monograph, first, we explore the use of objective content-based features to model the individualized (subjective) perception of similarity between multimedia data. We present a content-based RS which constructs music similarity perception models of its users by associating different similarity measures to different users. The results of the evaluation of the system verify the relation between subsets of objective features and individualized (music) similarity perception and exhibit significant improvement in individualized perceived similarity in subsequent recommended items. The investigation of these relations between objective feature subsets and user perception offer an indirect explanation and justification for the items one selects. The users are clustered according to specific subsets of features that reflect different aspects of the music signal. This assignment of a user to a specific subset of features allows us to formulate indirect relations between his/her perception and corresponding item similarity (e.g., music similarity) that involve his/her preferences. Consequently, the selection of a specific feature subset can provide a justification/reasoning of the various factors that influence the user's perception of similarity to his/her preferences.

Secondly, we address the recommendation process as a hybrid combination of one-class classification with collaborative filtering. Specifically, we follow a cascade scheme in which the recommendation process is decomposed into two levels.

In the first level, our approach attempts to identify for each user only the desirable items from the large amount of all possible items, taking into account only a small portion of his/her available preferences. Toward this goal, we apply a one-class classification scheme, in the training stage of which only positive examples (desirable items for which users have expressed an opinion-rating value) are required. This is very important, as it is sensibly hard in terms of time and effort for users to explicitly express what they consider as non-desirable to them. In the second level, either a content-based or a collaborative filtering approach is applied to assign a corresponding rating degree to these items. Our cascade scheme first builds a user profile by taking into consideration a small amount of his/her preferences and then selects possible desirable items according to these preferences which are refined and into a rating scale in the second level. In this way, the cascade hybrid RS avoids known problems of content-based or collaborative filtering RS.

The fundamental idea behind our cascade hybrid recommendation approach is to mimic the social recommendation process in which someone has already identified some items according to his/her preferences and seeks the opinions of others about these items, so as to make the best selection of items that fall within his/her individual preferences. Experimental results reveal that our hybrid recommendation approach outperforms both a pure content-based approach or a pure collaborative filtering technique. Experimental results from the comparison between the pure collaborative and the cascade content-based approaches demonstrate the efficiency of the first level. On the other hand, the comparison between the cascade content-based and the cascade hybrid approaches demonstrates the efficiency of the second level and justifies the use of the collaborative filtering method in the second level.

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