# INTERFACES FOR DIGITAL TELEVISIONS USING CONTENT BASED STRATEGY

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**Abstract:** In view of the information overload that exists in numerous domains, recommender systems evolve. The content-based recommenders offer products similar to those the users liked in the past. We propose a personalized recommender system that captures the user's viewing habits without obstructing the usual way TV is watched by implicit feedback method. Our proposal describes user modeling, program representation and retrieval, and aggregation of user's estimated interests. We believe the proposed method promptly learns the user's preferences and delivers valued recommendations using content based strategy.

# 1. INTRODUCTION

Information overload has become increasingly severe in our modern times of global communication facilities, omnipresent mass-media and hampering the user's differentiate relevant and irrelevant ability to information. Therefore, significant research efforts have been striving during the last years to conceive automated filtering systems that support users with interesting and desirable information [1]. In the last 10 years, the so-called recommender systems have been gaining momentum as another efficient means when searching for relevant information thereby reducing complexity. Apart, recommender systems have also attracted increasing public interest, leveling the ground for new business opportunities in different fields, such as e-commerce and Digital TV [2, 3]. Their main objective is to sift through very large sets of information and to select those products the users will appreciate, based on their history of purchase, past preferences, or demographic information.

Recommender systems can run either remotely in a server or locally in a domestic or mobile consumer device that implements several personalization strategies. One such strategy was content-based filtering, which suggests to a user products similar to those he/she preferred previously. Because of its accuracy, this technique is limited to the employed similarity measures. These measures are based on syntactic approaches that only detect resemblance between products that share few of their or all attributes [4].

Consequently, conventional approaches lead to overspecialized suggestions including only products that bear a strong resemblance to those the user knows before (i.e. products that are already defined with attributes in his/her profile). The existing recommender systems fight overspecialization by a strategy named collaborative filtering, depending on offering to each user products that have been appealing to others with similar preferences (named his/her neighbors). Collaborative filtering alleviates overspecialization, but a new limitation arises, such as scalability problems. It is difficult to select each user's neighborhood when the available preferences are sparse, and privacy concerns connected to the confidentiality of the users' personal information [5].

We observe Television broadcast as it is a widely spread communications service, it has well set up usage design, and it is facing an expansion of available content currently. The restriction to this particular service does not influence the applicability of the results or the generality of our analysis. In order to help the users in find their interesting programs, cable operators nowadays propose electronic program guides (EPGs) as an element of subscription packages. These usually favor nothing more than a set of programs that are exposed at a given time; in that sense, they do not differ from print TV magazines. What the users would truly profit from is a personalized program guide that would mark and learn their viewing habits – without causing any major discomfort to the user and then recommend them only the programs they were likely to be interested in. This is a typical task for recommender systems [6].

We identify three characteristics of the existing TV broadcast which influence the design and function of personalized program guides, i.e. limited user interface, lack of return channel and well-established usage habits. The lack of return referred as uplink channel means that the user equipment (set-top-box or TV receiver) cannot send the captured data about user's viewing favorites to the network center, which further means that it is not possible to consider the viewing patterns of other users. It is discussed that TV recommender systems should therefore depend on the methods that could be applied locally in the user's TV receiver [7,8]. This eliminates the otherwise hybrid recommenders and superior collaborative and leaves the content-based systems, known from information retrieval, as methods of choice for personalized EPGs.

# 2. TECHNOLOGICAL LANDSCAPE

In order to fulfill the goals of our strategy it is necessary to combine technologies from diverse areas of information and communications technology:

• Semantic annotation of TV programs. Firstly, the TV programs must be commented by metadata that describe accurately their main attributes that are available during the recommendation process.

• Formalization of domain knowledge. The knowledge provided by the comments of the TV programs must be defined to carry out the allowable reasoning processes that advance to our enhanced recommendations. For that purpose, we exploit the mechanisms developed in the Semantic Web, a startup in which data are given a well-defined definition, better enabling computers and people to work in cooperation [9].

• TV platforms. Finally, it is also necessary to bear in mind the characteristics of the TV platforms for the domestic receivers and mobile devices used to access the suggested TV programs, considering the technical aspects of the available broadcast networks.

# 3. CONTENT-BASED STRATEGY

With the goal of diversifying the recommendations in the TV domain, our personalization strategy suggests programs that are semantically associated with the programs the viewer has likely to be interested in the past, ignoring the syntactic similarity measures [10] adopted in the traditional content-based methods. Specifically, our reasoning-based strategy consists of two phases *–filtering phase* and *recommendation phase* – which are described below:

• Filtering phase: Broadly speaking, our content-based strategy selects the instances of classes and properties that are relevant for the user, by considering his/her personal preferences. This module exploits the user profile to suggest appropriate items by matching the profile representation to the recommended items. The result is a binary or continuous relevance judgment (computed using some similarity metrics [11]), the latter case resulting in a ranked list of potentially interesting items.

• **Recommendation phase**: The knowledge inferred from the filtering phase is processed in the second phase. This smart mechanism can: (i) explore the entities efficiently and associations identified during the filtering phase, and (ii) select among them the TV programs suggested to the user.

Our approach models the user's profiles based on the user's preferences and interests. Specifically, we propose a semantic model for each user that provides information about:

• the TV programs that were appealing and uninteresting for him/her (named positive and negative preferences [12], respectively),

- Their main attributes, and
- The genres under which these programs are classified.

This user modeling approach has two main strengths:

On the one hand, our profiles provide a formal representation of the users' preferences, being able to reason about them and find out extra knowledge about the user's interests. Such knowledge allows comparing effectively the users' preferences with the available products, thus leading to personalization processes more accurate than the traditional syntactic approaches [5]. On the other hand, our approach does not require defining in each user's profile the classes, properties and instances that identify his/her preferences [13], thus reducing the storage capabilities required in the recommender system.

The concept applied to content-based filtering try to find the most relevant documents depending on the user's past behavior. Such approach however confines the user to documents similar to those already seen. This is known as the over-specialization problem. The interests of a user are rarely static but change over time. Instead of adapting to the user's interests once the system has received feedback one could try to judge a user's interests in the future and recommend documents that contain information that is entirely new to the user. To overcome the over-specialization problem and to enhance the user's viewing experience, three adaptive feedback schemes were proposed in [14]. It is clear from the results that the implicitly positive feedback scheme obtains the best performances, in terms of both success rate and user comfort.

#### 4. **RESULT AND DISCUSSION**

In the paper, we presented a framework for recommender systems in TV which includes user profile modeling, aggregation of user's interests and program retrieval. It is estimated that the proposed method is efficient when used in interactive TV platforms. It is also discussed that the proposed work, when implemented with implicit feedback method would be more effective with simpler interaction with the user.

#### 5. CONCLUSION

We have proposed a method of Content-based recommender systems for TV. The personalization strategy overcomes unresolved limitations of the existing TV program recommender systems. Moreover, we also observed that our method can provide more suitable programs or user preferences, even when the number of recommended results is small. Further, we aim at resolving the over-specialization problem by using the implicit-feedback method.

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