Context-Aware Music Recommender Systems

[Workshop Keynote Abstract]

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Recommender Systems (RSs) are software tools and techniques providing suggestions for items to be of use to a user [20]. In the music domain recommender systems can support information search and discovery tasks by helping the user to find relevant music items, for instance, new music tracks, or artists that the user may not even know [18, 9].

Several techniques have been proposed but most of the available systems use either content- or collaborative- or social-based approaches, or even more often, a hybrid combination of these three basic approaches [9, 7]. The recommendation algorithm is content-based, when the features of the music tracks that are liked by the user are considered when the system predicts what else the target user may like. Music features can be extracted directly from the music content, with signal processing techniques, or can be based on metadata (e.g., genre, year, author). Conversely, in collaborative-based approaches the system ignores the items' descriptions, i.e., their features. It tries to find users with music preferences that are similar to those of the target user. Two users are estimated as similar by observing only the co-occurrences of the items in the sets of items liked/purchased by the two users. Then, the system recommends to the target user items liked by these similar users and novel to the target user.

A third approach, which is called social-based, is emerging in the music domain. It is based on computing similarities among the items to be recommended (music songs or artists) through web mining techniques, or on exploiting social tagging information [8]. Social-based recommendations can be generated by using the similarities of artists that in turn can be computed using the social activity of the users, for instance by analyzing: the songs played by a community of users in the same listening sessions, or the tags assigned by users to songs or artists. The rationale of this approach is that items similar to those that the user liked will also probably be relevant to the user.

However, notwithstanding the fact that music recommender systems are among the most common applications of recommendation techniques, there are very few music recommender systems that are capable to adapt their suggestions to contextual conditions important to predict the user's preferences at a particular moment or situation. This is an important issue for a music recommender system, since people often seek music for a contextual situation like an occasion,

an event or an emotional state rather than by an artist or song information [14]. To cope with these needs, recently there has been an emerging interest in contextual, or situational music selection [16]; the idea is to recommend music depending on the user's actual situation, emotional state, or any other contextual condition that might influence the user's emotional response and therefore the evaluation of the recommended items.

Context-aware music recommender systems can benefit from a number of techniques and methodologies that have been proposed, developed, and tested in the larger scope of context-aware recommender systems [2, 1]. Nevertheless, context modeling and context-dependent reasoning is a complex and still novel subject, and there are major technical and practical difficulties that remain to be solved.

First of all, reliable data describing how the user preferences are influenced or changed in alternative contextual situations must be obtained [3]. This requires to ask the users to elicit their preferences, hence the time required and the effort that the users must spend to enter such information must be minimized, e.g., by relying on active learning strategies [10], and more and more on implicit rather than explicit feedback [19, 12].

Then we should be able to select the right contextual information, i.e., relevant in a particular personalization task [4]. In fact, using irrelevant contextual data can jeopardize the quality of the recommendations, as irrelevant features can deteriorate a machine learning classifier. Furthermore, the collected data, that sample the user preferences in different contextual situations, must be provided to an effective rating prediction model. This means that the model, for instance one based on matrix factorization [15], must be redesigned so that it can really benefit from this additional information [5].

It could also be useful to exploit the social dimension of the music data, and in particular the tagging information could be integrated to adapt the recommendation to specific contextual dimensions such as the sightseeing or the historical monuments that the user is visiting while listening to music [13, 11].

Finally, it is important to understand the impact of the contextual dimensions on the personalization process, which means that not only the items to recommend but also the information presentation and the human/computer interaction strategy must be adapted to the context [6, 17]. This will enable us to build new user interfaces that can offer context-aware recommendations in a more engaging and effective way [6].

These topics will be illustrated in the talk, making examples taken from the music recommender systems that our research team has developed.

Categories and Subject Descriptors

H.3.3 [**Information Storage and Retrieval**]: Information Search and Retrieval—*information filtering*

General Terms

Design, Experimentation, Human Factors

Keywords

Music recommender systems, context awareness, mobile services, tags

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