Content-based computational model based on music preference structure for music recommendation

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Music preferences have most often been analyzed from genre perspective [1]. Genre preference clusters are of interest for music recommendation and other music similarity tasks. In different studies, the number of preference clusters discovered was reported to be relatively small (from 4 to 9 [2]). However, using genre-preference questionnaires leads to methodological problems. Genres are ill-defined music categories, and there is no established list of major genres. A content-based approach to this problem would eliminate these problems. Also, in music recommendation system, using content-based approach will help to avoid possible problems with low-quality or missing metadata.

In this research we build a computational model of music preference structure based on audio content. We base it on a psychological research of content-based music preference clusters [1, 3]. In [1,3], Rentfrow et al. conducted a series of music preference studies using excerpts of real music in various styles, and discovered a five-factor structure, namely Mellow, Unpretentious, Sophisticated, Intense and Contemporary (\emph{MUSIC}). We reuse the data collected in five studies described in [1,3], which comprise of 249 songs and hundreds of ratings and attribute scores. We develop an acoustic content-based attribute detection using auditory modulation features and a regression by sparse representation. We then use the estimated attributes in a cold start recommendation scenario. The proposed content-based recommendation significantly outperforms genre-based and user-based recommendation based on the root-mean-square error. The results demonstrate the effectiveness of these attributes in music preference estimation. Such methods will increase the chance of less popular but interesting songs in the long tail to be listened to.

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[3] P. J. Rentfrow, L. R. Goldberg, D. J. Stillwell, M. Kosinski, S. D. Gosling, and D. J. Levitin, "The song remains the same: A replication and extension of the MUSIC model," *Music Perception*, vol. 30, no. 2, pp. 161–185, 2012.