15780 - Project Proposal

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22 March 2017

1 Objective

To implement a recommender system for a song database with the following techniques:

1. Collaborative Filtering
2. Content Based Recommendation
3. Hybrid implementation of Collaborative and Content Based Recommendations

2 Dataset

The dataset we propose to use is the Million Song Dataset [1]. It contains entries of the form $\{user\_id, song\_id, number\ of\ plays\}$. It also contains metadata which includes *key*, *pitch*, *loudness*, *tempo*, *year of song* etc.

3 Approach

There are two ways to approach the recommender system problem: collaborative filtering and content based recommendation. In collaborative filtering, ratings for songs are predicted based on ratings by similar users. To find similar users we propose to use Pearson Correlations [2].

In content based recommendation, information about a song such as the metadata (*artist*, *album*, *year of release* etc) and audio features (*key*, *pitch*, *tempo* etc) are used to make recommendations. We propose to compute the similarity of a song with the user-profile based on keyword overlap. The keyword overlap will be found using Term-Frequency-Inverse Document Frequency (TF-IDF) [3]. The Recommendations will be made based on N nearest neighbours.

In case of a hybrid implementation we will try the following:

1. Combining Approaches at algorithmic level

2. Using counters to pick one of the two recommendations based on past history

References

[1] Thierry Bertin-Mahieux, Daniel P.W. Ellis, Brian Whitman and Paul Lamere *The Million Song Dataset* Proceedings of the 12th International Conference on Music Information Retrieval (ISMIR), 2011

[2] P. Resnick, N. Iacovou, M. Suchak, P. Bergstrom and J. Riedl *Grouplens: An open architecture for collaborative filtering of netnews* Proceedings of the ACM 1994 Conference on Computer Supported Cooperative Work, pages 175-186, New York. ACM

[3] Dietmar Jannach and Gerhard Freidrich *Tutorial: Recommender Systems* International Joint Conference on Artificial Intelligence, 2013