Deep music recommendation based on audio processing and latent semantic analysis

**Abstract**

Recommender systems based on collaborative filtering are dominating the music streaming services market as a way of creating a social-driven user profile where new music is pushed based on the listening activity of a user’s friends. Although hybrid recommender systems are used as a way of particularizing the profiles and reducing the dependency on the activity of others, most of these systems only make use of the user’s direct feedback to the platform’s content, such as a rating given by the customer. The only outlier on the market currently using a more complex content-based filtering is Pandora, a streaming service that creates a personalized station based on a song or artist’s properties (a subset of attributes provided by the Music Genome Project).

However, there is still room for research in the field of recommender systems in streaming services. This thesis aims to explore the possibility of building a multi-modal convolutional neuronal network to generate attributes for a content-based filtering recommender system. The goal is to push new recommendation not only by looking at similar artists in the same genre, but also by finding music from other styles that basically fits in the same atmosphere and mood given by the user’s listening history.

An intitial set of data (tracks, artists) based on what the streaming service api deems as similar to the user’s recent listening history is filtered through the aforementioned deep neuronal network by processing each item of the set in two layers. The first layer narrows the data set by placing each track in psychologist Robert Thayer ‘s model of mood, interpreting each song’s levels intensity, timbre, pitch, rhythm, acousticness and gloom. These features are valued by analyzing the PCM wave data samples of a track. The second layer filters the narrowed set of data by using an algorithm of latent semantic analysis for the lyrics, in order to determine the general mood conveyed by the sung words. Thus, the system would generally build a new set of recommendations for the streaming service user that matches the mood of the music already listened.

In order to demonstrate the concept, the proposed Moodify Android app makes use of the Spotify API to generate automated playlists classified by mood for the Spotify user, based on his/her listening history, at the request of the user.