Research project proposal: Music Preference Modeling
Dan Ellis and Adam Berenzweig {dpwe,madadam}@ee.columbia.edu
2003-10-31

Introduction
To support the development and evaluation of automatic signal-based music similarity measurements, we proposed a long-term study on musical taste and listening habits. Our goals are:

• Gather long-term (6 month at least) data about user’s listening habits: what tracks they listen to, how often, how this changes over time.
• Use the data for evaluation and development of music recommendation systems.

The data would be gathered for a set of users, minimally 10, ideally up to 100. Their musical tastes would be roughly matched, to ensure overlap in the music they listened to. We will likely limit ourselves to contemporary rock/pop music.

Music enthusiasts may voluntarily donate this information, but if necessary we can compensate the participants “in kind” e.g. with the new iTunes store gift certificates.

Data
Automatic temporal listening data: This data is gathered passively, that is, with no special action required from the user.

• track name
• each play: date/time, length
• number of plays (can infer from play time stats)
• play order (can infer from play time stats)
• rating(? depending on whether the player supports it. not really passive)

Preference or ratings data would be wonderful if possible, but probably would greatly limit the participation and may not be worth the cost.

It would also be very valuable to collect user-contributed metadata such as the ‘phase’ of their daily routine during which the music was being played (bedtime, work, relaxing, commute, etc.) We may be able to infer this from date/time stamps. Self-reported information on the listeners’ mood would be very interesting, if it was practical to collect.

Analysis
The data we collect will be used for:

• Evaluation of recommendation agents: How well do our automatic algorithms predict what the listener actually enjoys listening to?
• Analysis of taste trajectories, mood and time-of-day effects: How does musical preference vary with time/exposure?
• We will look at modeling listening as an optimization problem in which the listener ‘spends’ the resource of her listening time to maximize the pleasure received.
• Temporal proximity as similarity measure, and mood-sensitive recommendation.
Evaluation

One straightforward way to use the data is to run a predictive leave-one-out experiment. In other words, based on a user's listening habits until time T, predict future listening events, the addition of new artists to the collection, and so on.

We will investigate how this sequential listening data is different from static information about a user's collection. Actual listening patterns may provide more fine-grained distinctions between preferences for individual tracks in a collection, but there may also be more interesting order-dependent effects in listening. For example, I may not like Mr. Bungle if I hear it cold, but after exposure to Mike Patton's style in the more mainstream Faith No More, I become more receptive to the outlandishness of Mr. Bungle.

Based on our initial introspection, we expect to find evidence for distinct Taste Trajectory Classes

- Hot burnout
- Slow grow
- flat

Some research questions here include: Can we classify trajectories into types? How long are the regimes? Does the type, shape, and length of a trajectory change much across users for a given song? Across songs for a given user? Based on the current collection, can we predict the type of a new song? If so, this information can be applied in a recommender system, for example by only previewing “hot” items, and introducing slow burners in personalized radio streams.

Implementation

Data Collection: We write a simple client or script to run on user's machines that will upload their data automatically to us periodically. Alternatively, we ask users to bring in their machines (e.g. iPods) periodically or at the end of the study, and we upload data manually. Obviously, an automated approach is preferable: scales better, more timely, less risk of data loss.

In order to avoid copyright problems involved in transferring audio, we will supply participants with software to run on their machines to extract the high-level audio-related features we will use to describe the audio content of their music collections.

* end *