Predicting Song Popularity

Sam Xu *samx@stanford.edu*, Joyce Xu *jexu@stanford.edu*, and Eric Tang *etang21@stanford.edu*

***Abstract*—This project aims to predict the popularity of songs by analysing acoustic features such as tempo, duration, mode, loudness, key; artist information such as location and popularity; and metadata such as release title and year. The codebase for the project is located at `https://github.com/inSam/SoundScorer221`**

I. Introduction

The goal of this project is to predict the popularity of a song by analyzing its audio features and metadata. Such a tool would be valuable for record labels, streaming services, and average consumers; it would also help the research community understand what acoustic features are currently popular with the public. In this progress report, we would like to expand on (1) our overall strategy for dataset and feature extraction (2) details about our regression algorithms (3) next steps we plan to take to finish up our project.

II. Methods

A. Dataset

Our dataset comprises songs extracted from the Spotify API, which provides acoustic features, author information, and song metadata. More abstract features such as dancebility, energy, and song popularity were pulled from the Echo Nest, whose database is incororated into the Spotify API.

B. Feature Selection

1) Baseline Features: stuff

2) Additional Features: more stuff

C. State Vector Machine

As our first algorithm, we chose to to leverage non-linear support vector regressor(SVR) as our regressor.

III. Next Steps

A. Improve Features

We will extract more features from the Spotify database such as song age, location, audio sections, and signature. We will also try to construct more advanced features from historical data such as musical trends. Using Spotify's provided links to song previews, we may be able to extract more advanced features from the audio recordings of each song. This step will involve a lot more feature tuning and experimentation.

B. Improve Models

For future models, we will try to tackle this problem by using ensemble methods such as gradient boosting regressors and random forests, support vector regressors, and neural networks to predict popularity. In particular, neural networks may be able to extract more meaningful features from the audio tracks of each song.

IV. Challenges

One challenge is to consider the effects of time on the popularity on the song. We may be able to tackle this by simply adding the age of the song as a additional feature.

Another challenge is that there is plenty of noise that influences a song's popularity, beyond its mere auditory features. While we have assumed a 100% success rate with our Oracle, this may be unrealistic to achieve with a classifier.

References

[1] Myra Interiano, Kamyar Kazemi, Lijia Wang, Jienian Yang, Zhaoxia Yu, Natalia L. Komarova, *Musical trends and predictability of success in contemporary songs in and out of the top charts* Royal Society Open Sciences, 2006.

[2] James Pham, Edrick Kyauk, Edwin Park, *Predicting Song Popularity* Stanford University CS 229, 2015.

[3] `https://developer.spotify.com/documentation/web-api/`

[4] Li-Chia Yang, Szu-Yu Chou, Jen-Yu Liu, Yi-Hsuan Yang, Yi-An Chen, *REVISITING THE PROBLEM OF AUDIO-BASED HIT SONG PREDICTION USING CONVOLUTIONAL NEURAL NETWORKS* Academia Sinica, Taiwan, 2017.