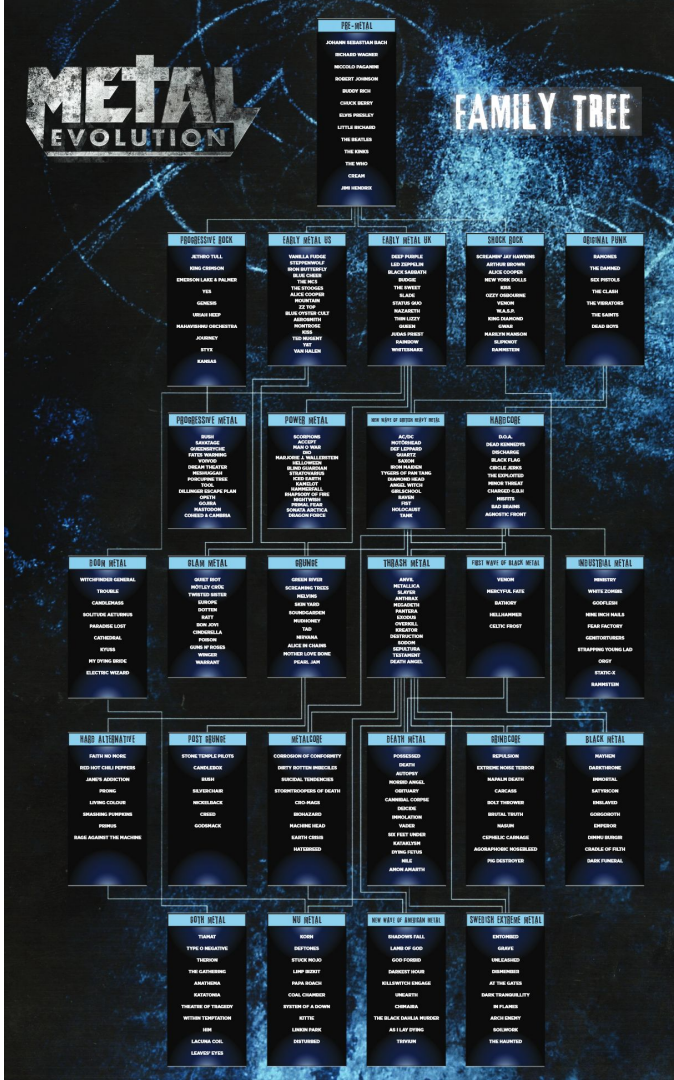
Clustering Music Into Predictive Subgenres

Victor Ramirez

Problem

- There are more ways to describe music than there are genres
- Difficult to find songs to recommend across genres
- Descriptive music genres are almost entirely human-labeled



Clients

The Big Guys:

The Little Guys: some underground startup, you probably haven’t heard of them

Data: Free Music Archive

- 3 csv files: tracks (metadata), genres (genre info), echonest (audio info)
- Using ~13,000 out of 150,000+ tracks
  - Only 13,000 tracks have the basic audio features
- Audio features (from Spotify):
  - Acousticness, Danceability, Energy, Instrumentalness, Liveness, Speechiness, Tempo, Valence
- Tracks have “main genre” and list of subgenres

Data Cleaning

- Extract tracks with relevant audio features
- Remove tracks with corrupt metadata
- Remove multi-index
- Translate genre ID’s to genre names
- Merge all spreadsheets into unified dataframe

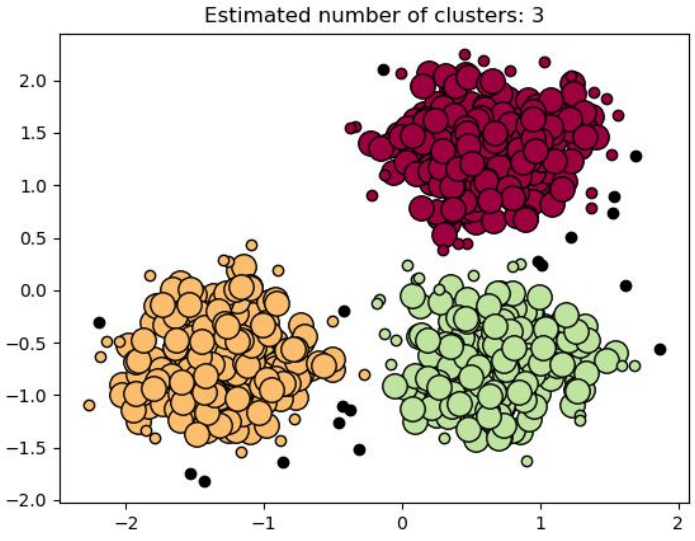
Approach: Clustering

Why not Classification?

- Classification requires “ground truth”
  - Here, we’re treating genres as a soft label

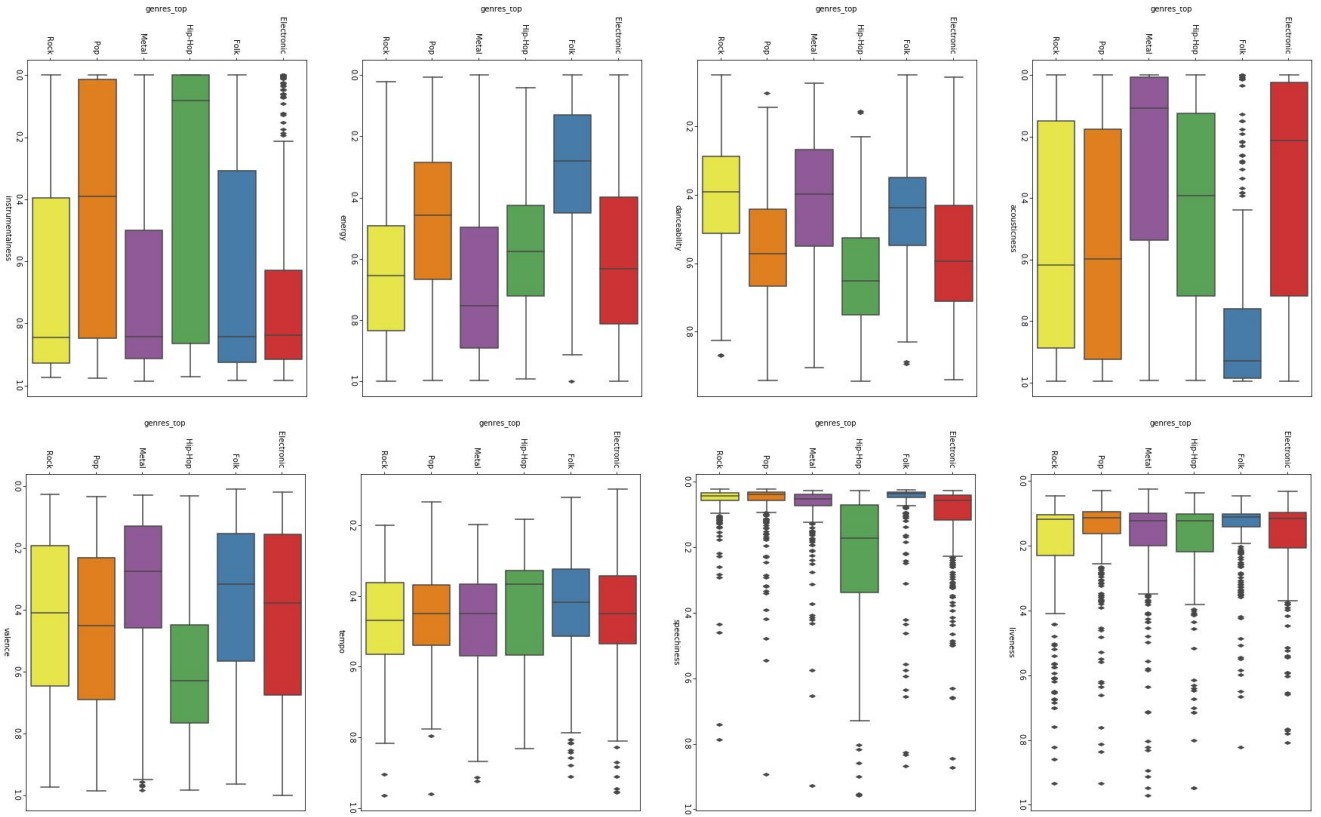
Why Clustering?

- Can find similarities between music without being bounded by genres
- More organic genre boundaries

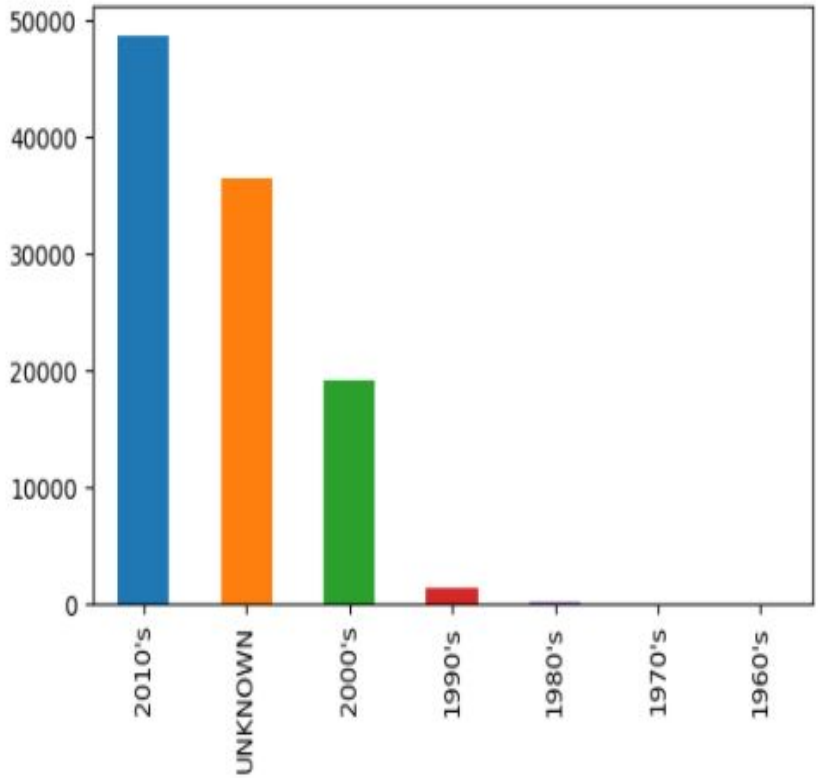


http://scikit-learn.org/stable/auto_examples/cluster/plot_dbscan.html

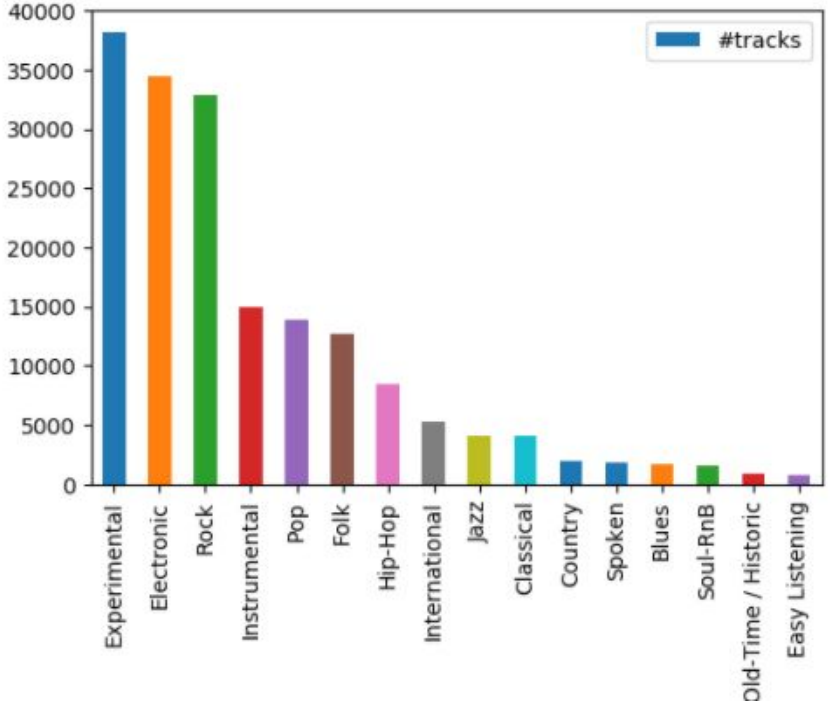
Audio Features Are Distributed Differently By Genre

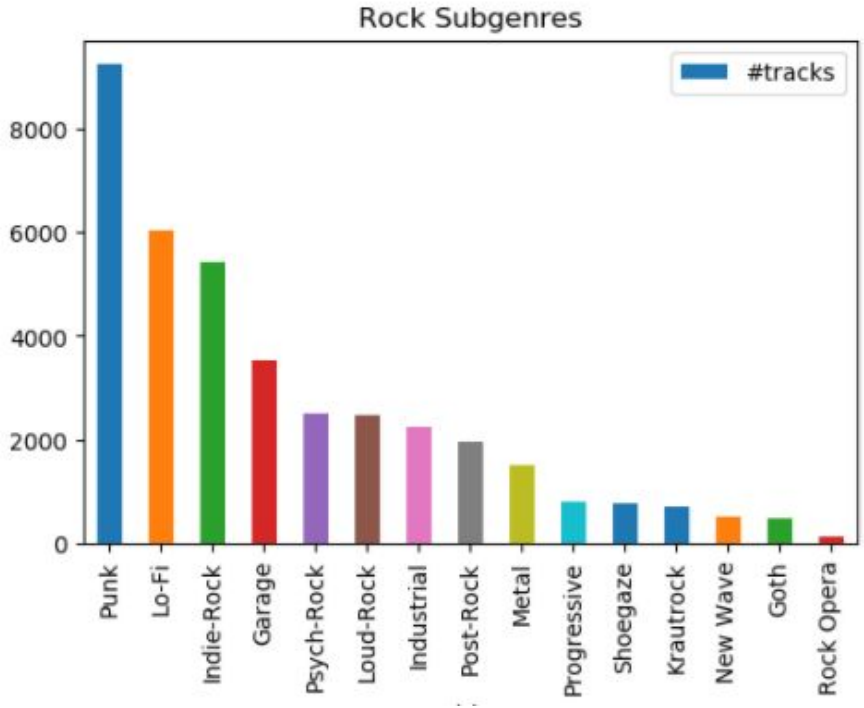


Most Of Our Music Is From 2000-2018



Genres And Subgenres Are Unequally Distributed

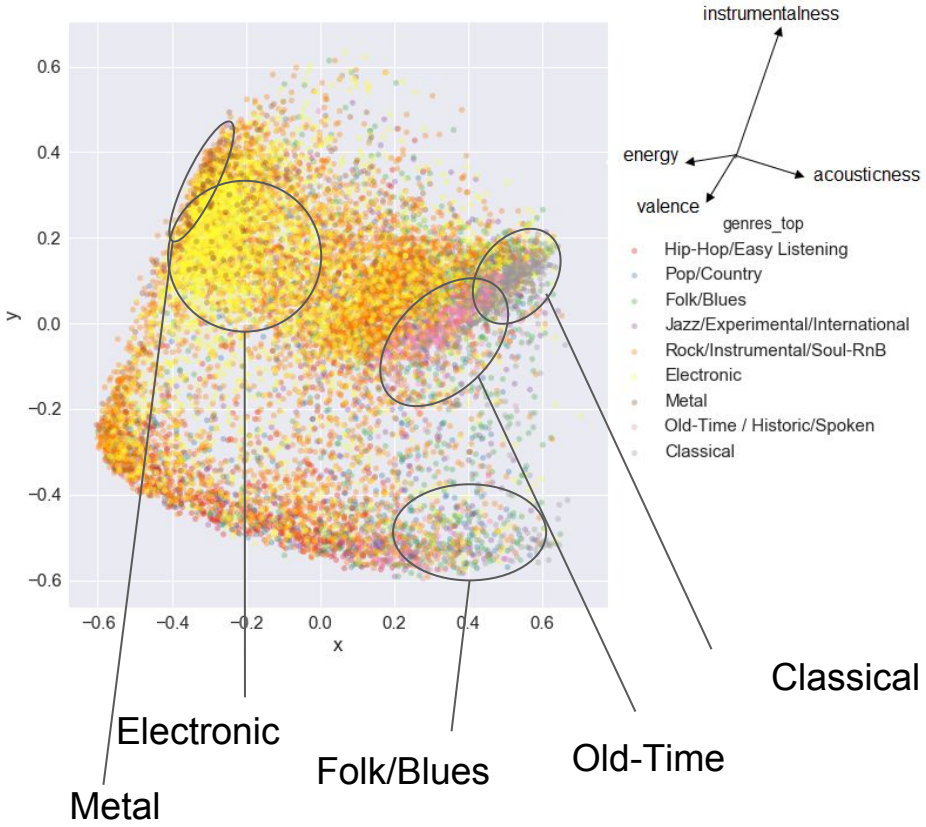


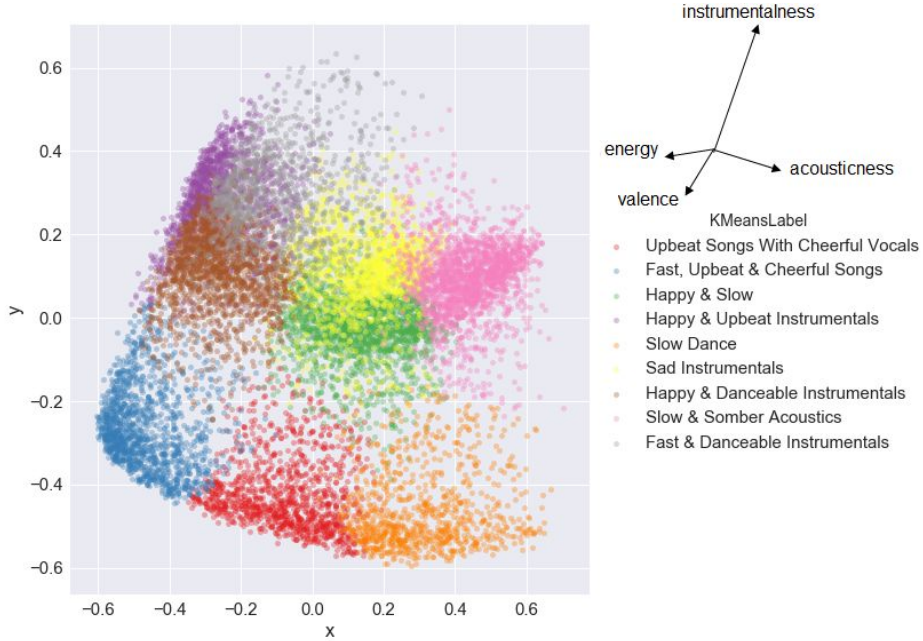


Machine Learning Methods

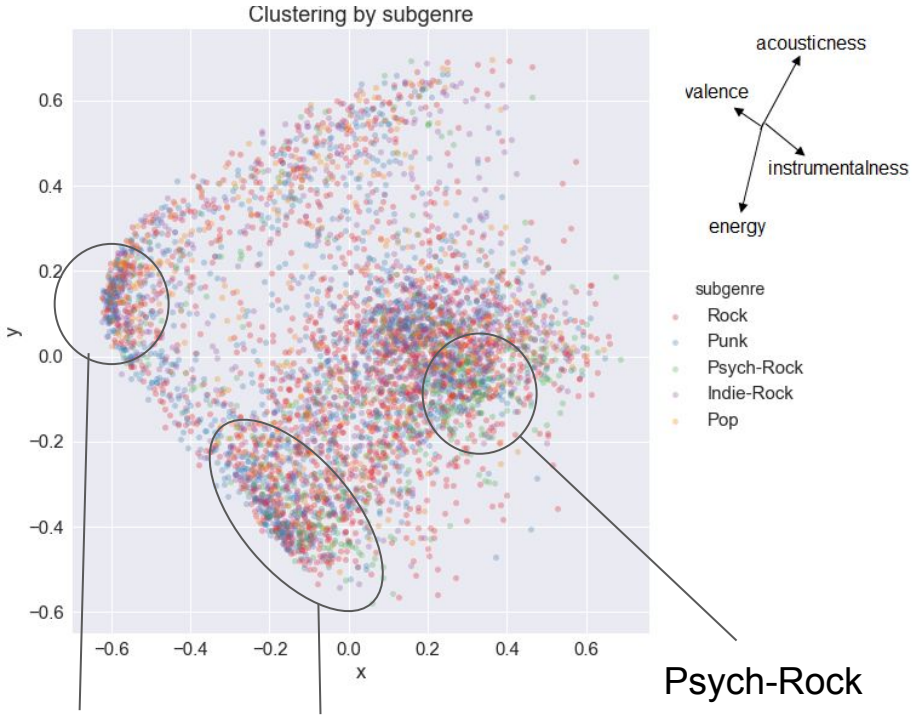
- Tested using K-Means, Mean Shift, Spectral Clustering
  - Chose K-Means because its clusters can be interpreted
- Chose K parameter as number of genres pre-defined by data
  - Elbow Method and Silhouette Scores suggested no conclusive parameters
  - K = number of genres leads to 1:1 comparison
- Applied PCA to reduce dimensionality for visualization

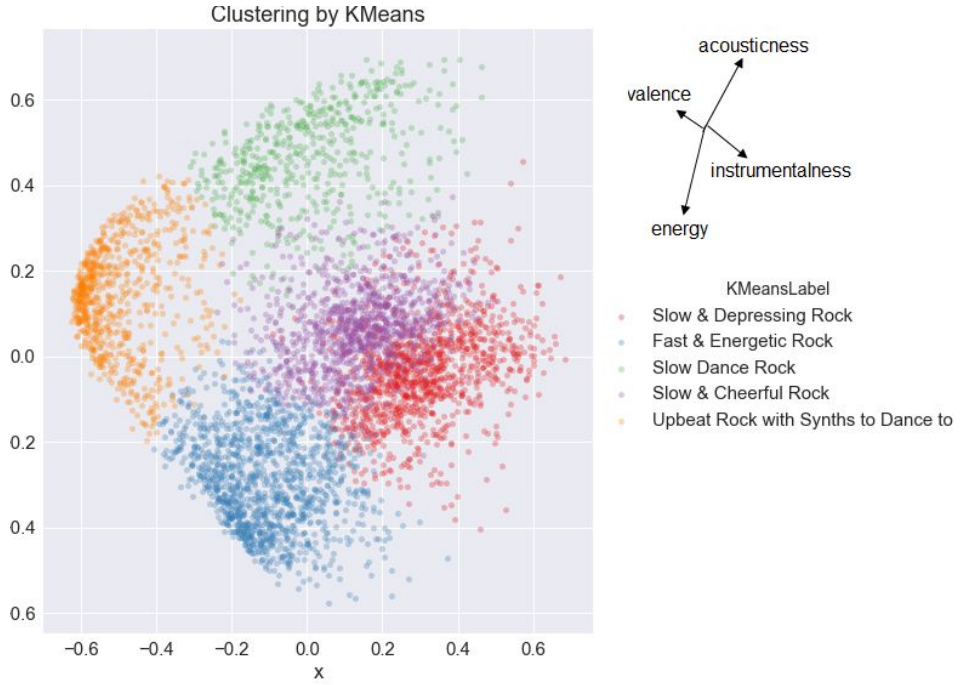
Results: All Genres





Results: Rock Tracks





Psych-Rock

~Pop/pop-punk

Punk

Conclusions / Recommendations

Audio features provide a powerful way of describing music

- Applicable so long as audio information and features are available

Clustering tracks by features allow cross-genre recommendations

- Useful for bolstering music recommendation

Describe music like never before

- Unique way to discover new music

Future Work

- Implement more tracks
- Create different audio features extracted from audio files (Distortion, Percussion, etc.)
- Augment with social features