

Live Music Prediction

Tommy Li, Yash Savani, Wilbur Yang

November 15, 2014

Abstract

We aim to anticipate the sound that is about to be played as we listen to music.

1 Data

We opted to analyze MIDI files, since they provided music in a format that was somewhat simplified to a way that humans might understand it. We wrote a python scraper to download MIDI files from midiworld.com. MIDI files are stored as sequences of starting and stopping times of notes with features such as channel, volume and time since previous note.

2 Features

We are using the python library Mido to parse the MIDI files. We intend to model music in terms of transition between various movements, and attempt to classify previously heard segment of music into movements. With this clustering we can start to build models of the relationships between movements and within movies and predict the next few notes by sampling randomly from the cluster we think we are in. As of now, we have a 12-dimensional feature space for the music, where we map points t in time to 12-dimensional vectors by letting each entry of the vector represent one of twelve possible keys and adding all notes occurring within a certain threshold τ of t to the corresponding position in the vector, weighted by volume.

3 Models

Our model for now takes discrete but many-valued inputs of all previously-seen sounds and outputs a predicted sound for the next few beats, purely using clustering for now, but eventually involving models within the clusters as well. We have implemented our models in Python.

4 Results

We have a visualization of our clustering on the MIDI files in Mathematica that seems promising, although we haven't explicitly make predictions with our model yet.

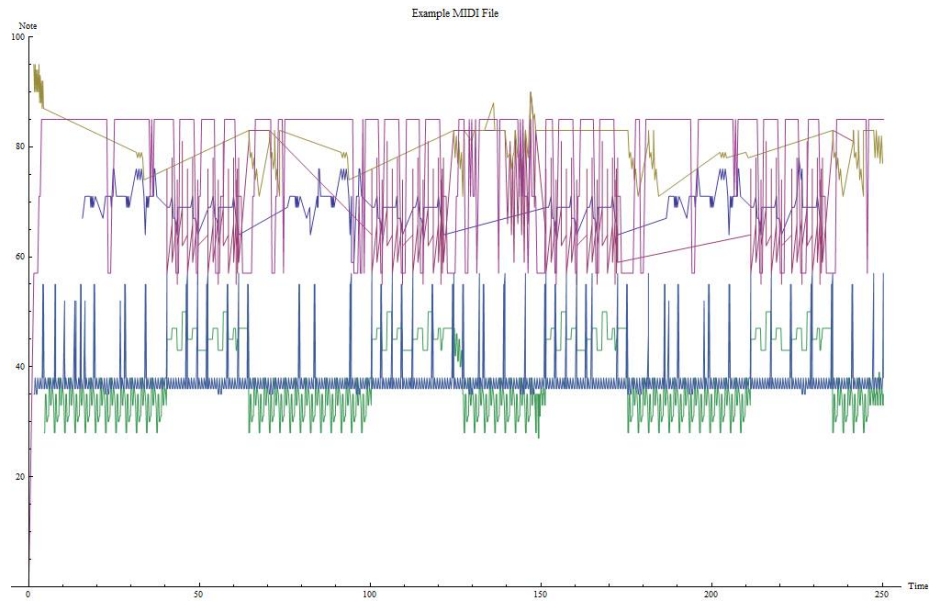


Figure 1: Purple line is cluster number prediction at each time. Other lines are melodies of various instruments.

5 Future

We want to

- Consult people with expertise in music theory to see what features from chord progressions may be useful
- Model transitions between the movements (clusters) of the music.
- Model transitions within movements of the music
- Examine how the algorithm may be trained to generate new music based on collections of music rather than emulate existing music based on a single sequence of sound.

6 Specific Questions

What's another model besides the Markov Chain that can make predictions on sequential information?