Musical Intelligence: Project Description

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1. Project Overview

Humans are naturally very good at understanding music. We measure as an input a seemingly chaotic sequence of air pressure values and our brain is able to decompose the incoming sounds into musical notes; recognize the instrument(s) being played; recognize the beat of a song; and much more. Can a computer do the same?

When AI techniques are applied to music, the objective is generally to generate music. That is not the goal of this project; rather, it aims to *understand* music. Depending on how well the rest of the session goes, I would like to develop a program that can do all of the above points, in the order they are presented.

There are many programs that already do this kind of musical analysis, such as Melody Scanner, Score Cloud, and Anthem Score. My goal will be to match the results obtained by these programs for relatively simple melodies.

2. Data Sets

Given how broad the problem at hand is and the several different ways to approach it, my data will be sampled from various sources, depending on the task at hand. Given that the data is mostly synthetic, there should not be a lot of pre-processing required.

- This Kaggle dataset for individual computer-generated notes;
- This website for MIDI melodies of all genres and artists;
- There is also the possibility of generating data through a program, either by hardcoding the notes or through tools like Sheet Music Generator and Garage Band;

3. Models and Techniques Used

Various analytical and machine learning techniques will be used, from Fourier Transforms to neural networks of many kinds; comparing the results of different techniques is also a desired objective.

4. Project Demonstration

The project will be demonstrated as a program that will receive music audio as an input and will determine its characteristics as an output, such as the notes played and the beat.