

Assignment 2

Rock & Roll and the Gabor Transform

DUE: Wednesday, February 10, 2021 at 11:59 pm PST
Late assignments will **NOT** be accepted

Professor: Jason J. Bramburger

In this assignment you will analyze a portion of two of the greatest rock and roll songs of all time. Download the two files **GNR.m4a** (14 second clip) and **Floyd.m4a** (60 second clip) that are included with the homework. These files play clips of the songs *Sweet Child O' Mine* by Guns N' Roses and *Comfortably Numb* by Pink Floyd, respectively. *Guitar World* ranked the GNR riff #37 all time, and the Floyd riff #4 all time. (Louder Sound put them at #8 and #2 all time). To import and convert them, use the following commands for both pieces. (NOTE: basically both pieces are converted to a vector representing the music, thus you can easily edit the music by modifying the vector).

```
1 figure(1)
2 [y, Fs] = audioread('file.m4a');
3 tr_gnr = length(y)/Fs; % record time in seconds
4 plot((1:length(y))/Fs,y);
5 xlabel('Time [sec]'); ylabel('Amplitude');
6 title('Sweet Child O' Mine');
7 p8 = audioplayer(y,Fs); playblocking(p8);
```

Perform the following tasks:

1. Through the use of the Gabor filtering we used in class, reproduce the **music score** for the **guitar** in the GNR clip, and the **bass** in the Floyd clip. Both are clearly identifiable. See Figure 1 which has the music scale in Hertz. (NOTE: to get a good clean score, you may want to filter out overtones... see below. NOTE 2: It is also helpful to plot the log of the spectrogram... so plot $\log(|s| + 1)$ where s is the spectrogram.)
2. Use a filter in frequency space to try to isolate the bass in Comfortably Numb.
3. See how much of the **guitar** solo you can put together in Comfortably Numb. It may help to look at smaller portions of the clip to guide your reconstruction of the music score.

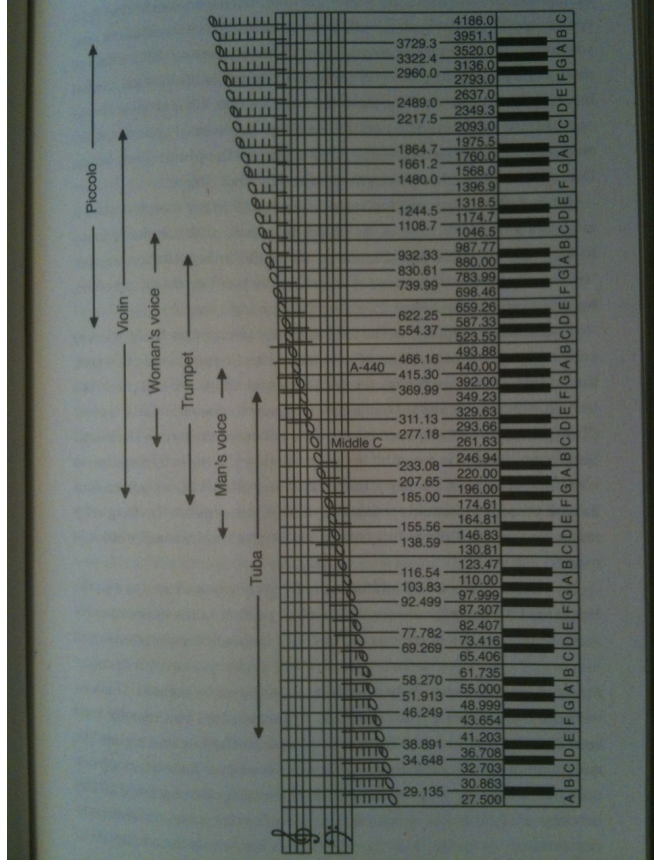


Figure 1: Music scale along with the frequency of each note in Hz