

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.

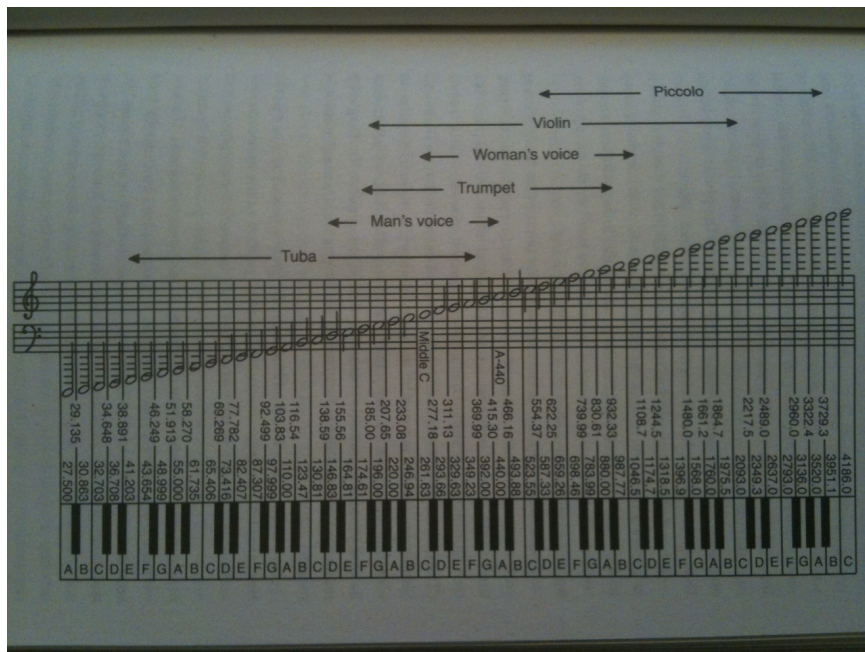


Figure 1: Music scale along with the frequency of each note in Hz