Identify chroma feature for chord recognition

December, 2022

Agenda

- Music concepts
- Project description
- Pitch extraction
- Chroma identification
- Results

What is a chord?

- Several notes that sound simultaneously.
  - 2 notes: dyad
  - 3 notes: triad
  - 4 notes: tetrad
- What's a note?
  - A named pitch: A, B, C…
- What's a pitch?
  - A sound in a certain frequency: A=440 Hz, C=261 Hz

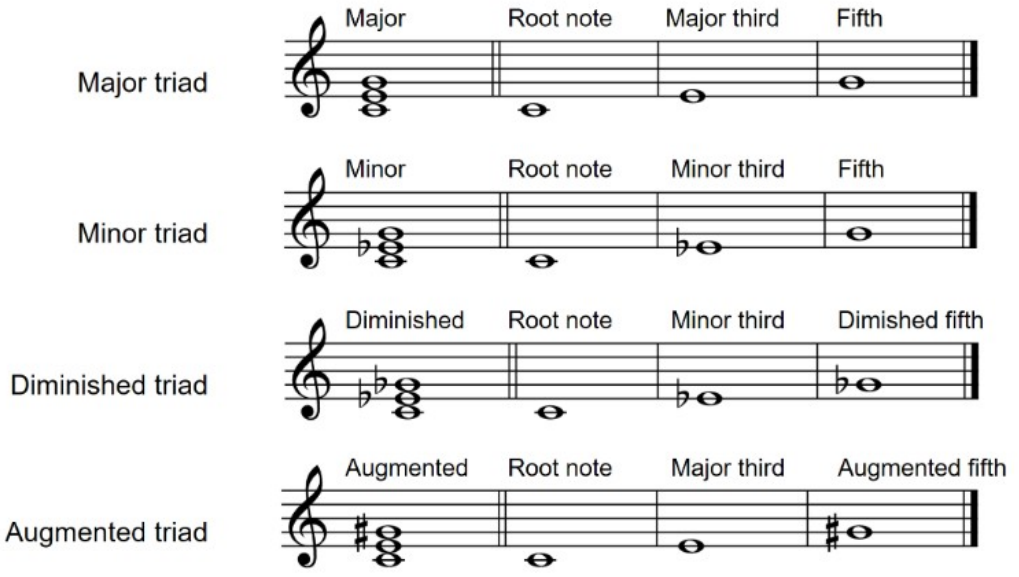
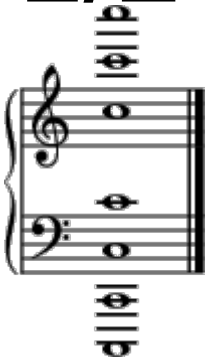


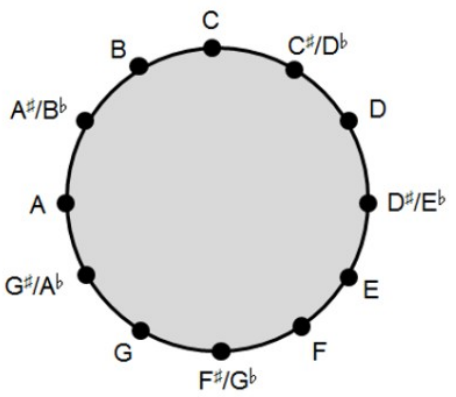
Figure 5.5 from [Müller, FMP, Springer 2015]

What is a chroma? 1/2

- All pitches equally spaced in frequency domain, belongs to the same Pitch Class.
- A pitch can be separated in two components: *tone height* and *chroma*.
- A Chroma is a way to categorize pitches from the same Pitch Class.
  - C2 and C5 both have the same chroma value C



All C from C1 to C7



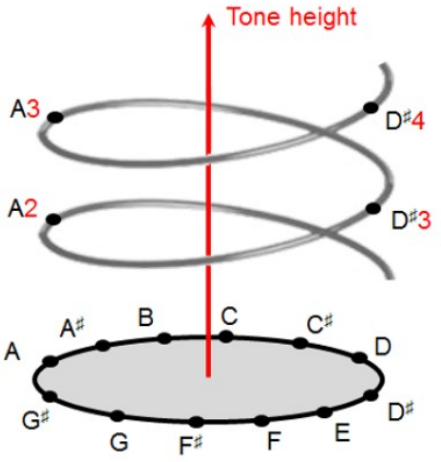
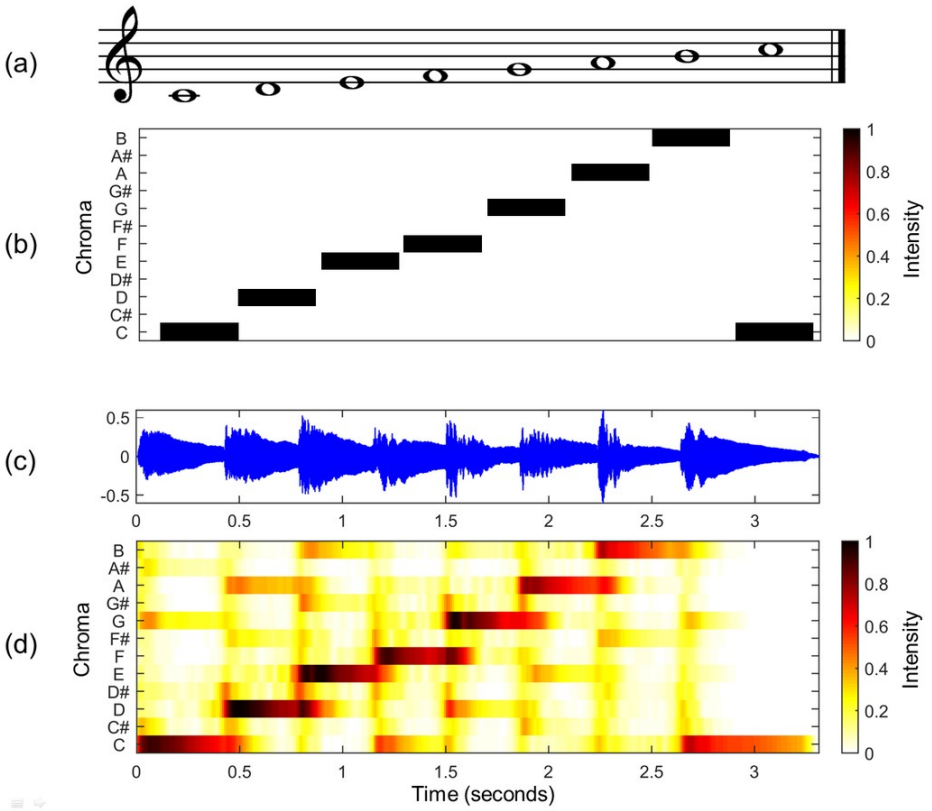


Figure 1.3 from [Müller, FMP, Springer 2015]

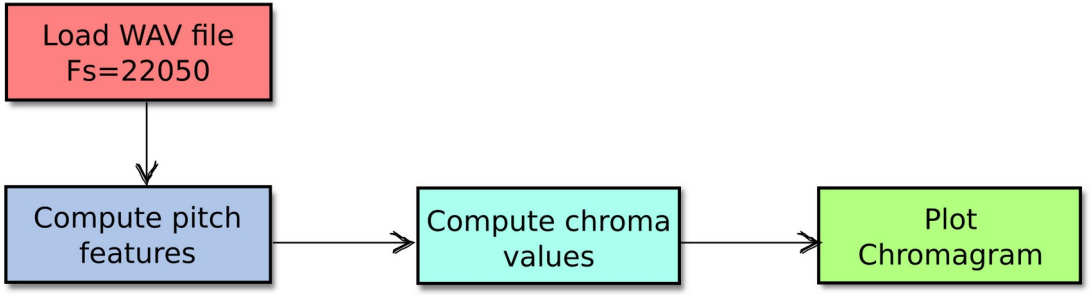
What is a chroma? 2/2



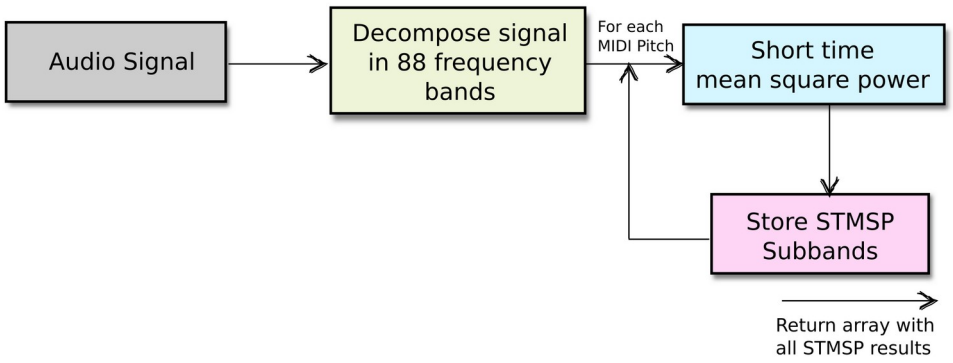
- A Chromagram shows the presence of all chromas in an audio signal for a given time window.

Objective

- For a given audio signal, compute and display the chroma values found.



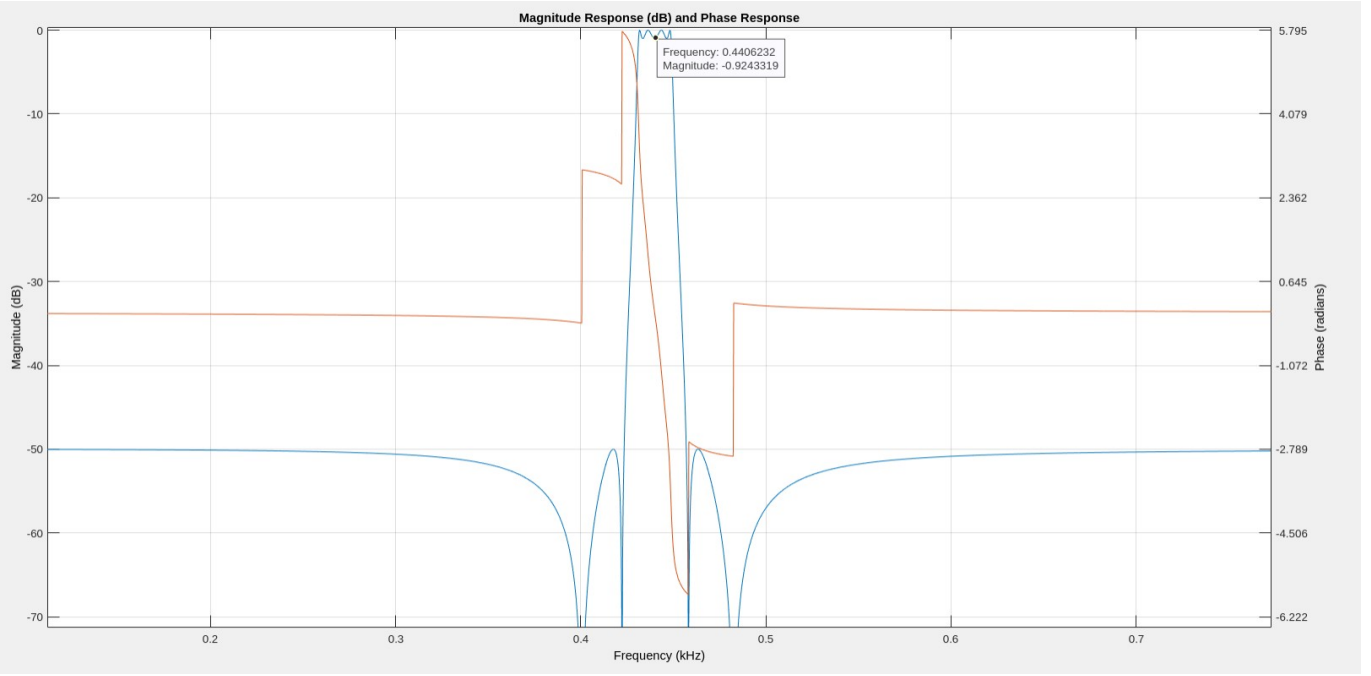
Compute pitch



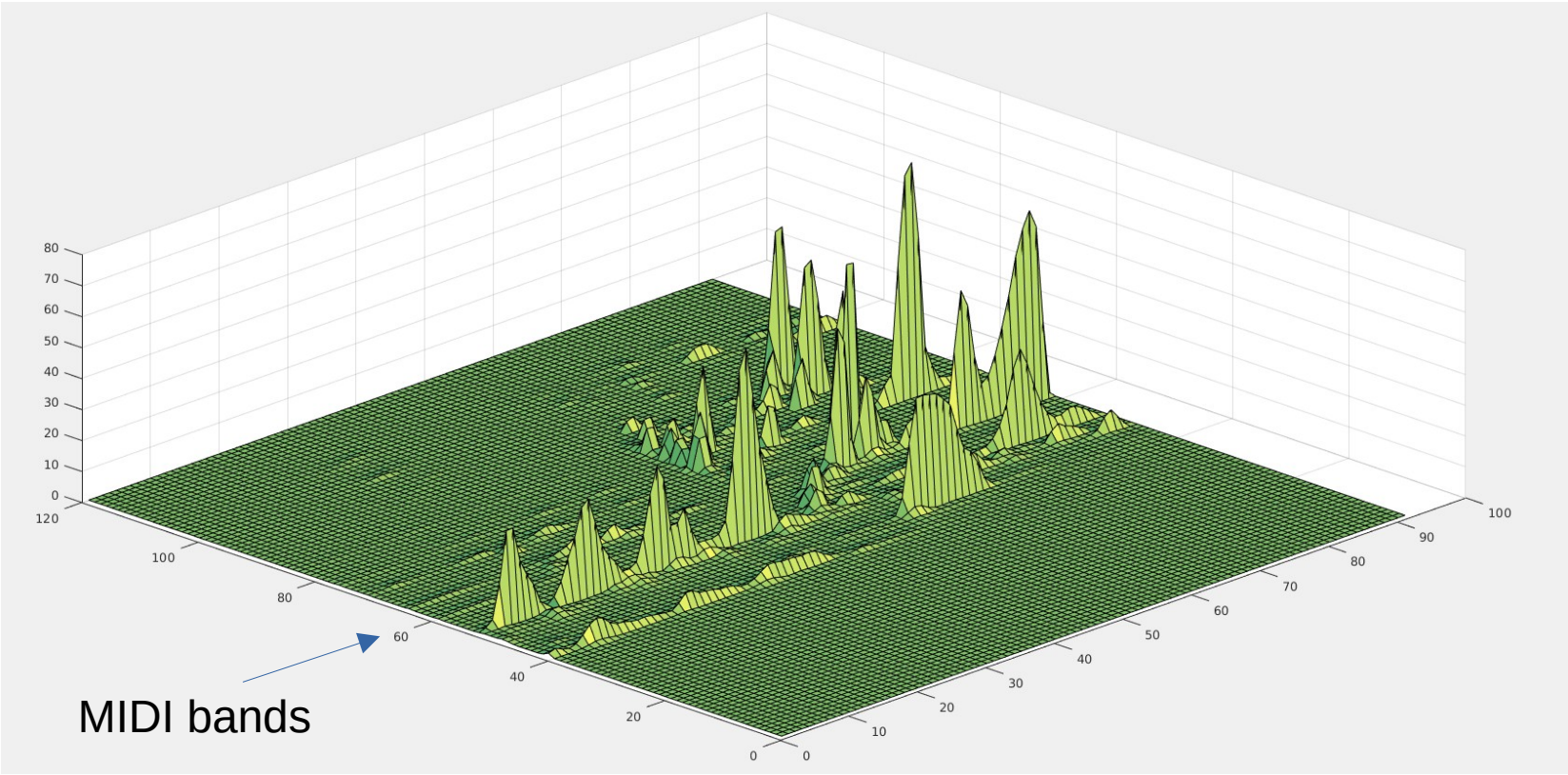
- Use a predefined filter bank to decompose signal in 88 sub-bands. (MIDI 21 to 108)
- On each MIDI pitch compute the STMSP
- Save the result in an array and return

Decomposing the signal

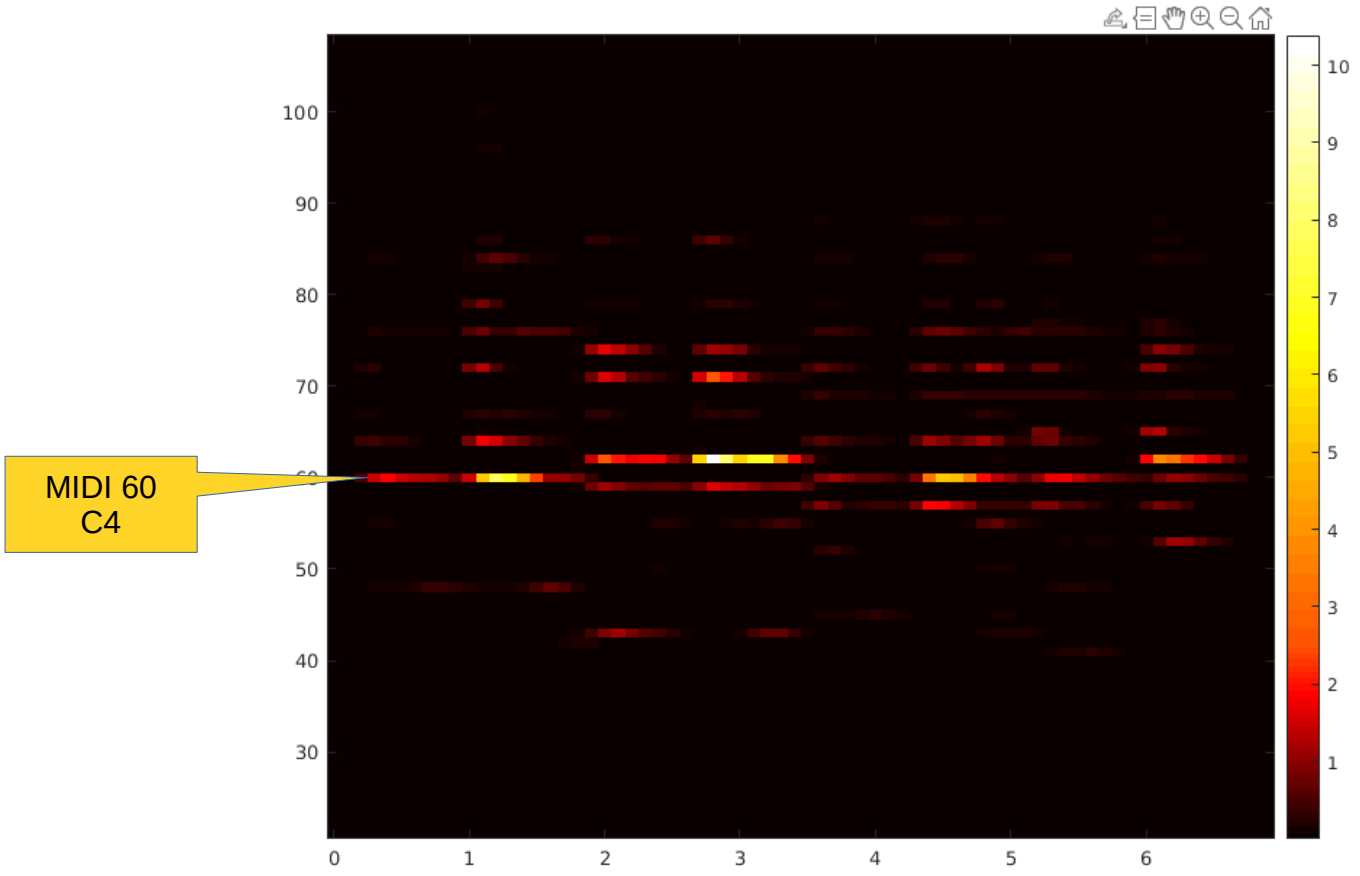
- Predefined filters created by paper's authors.
- Band pass filter for A4 = 440 Hz



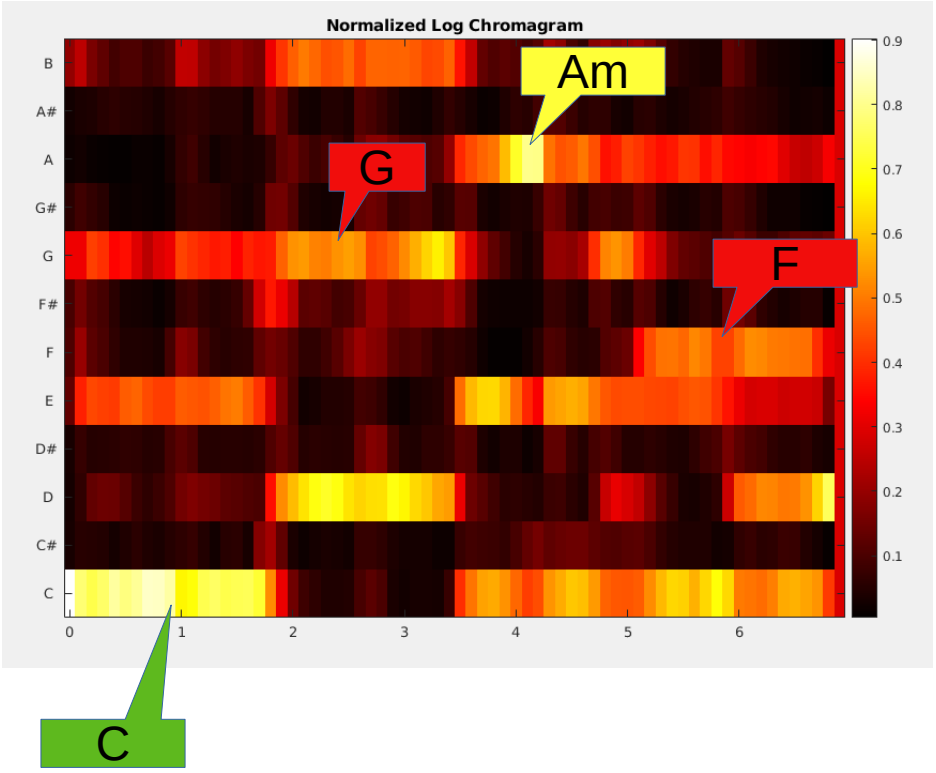
Pitches detected



Pitches colormap

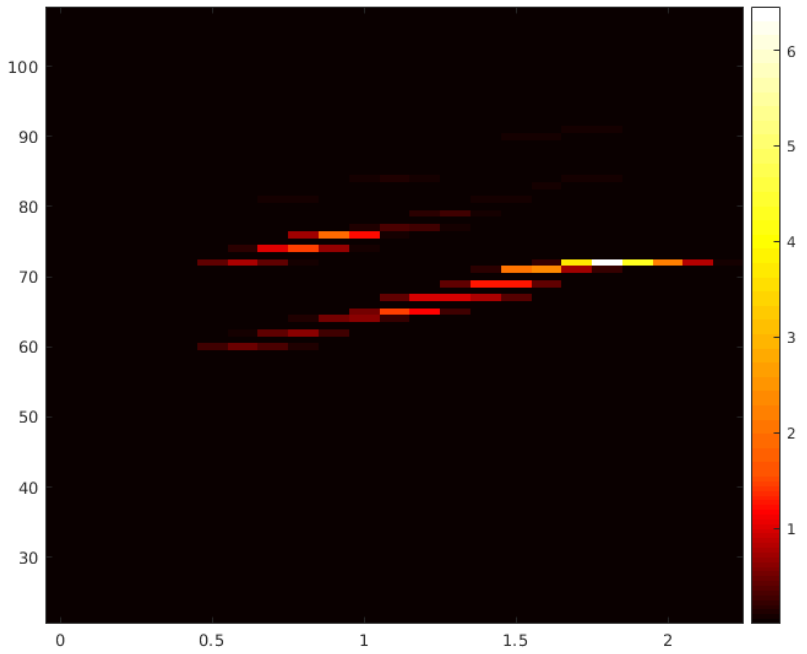


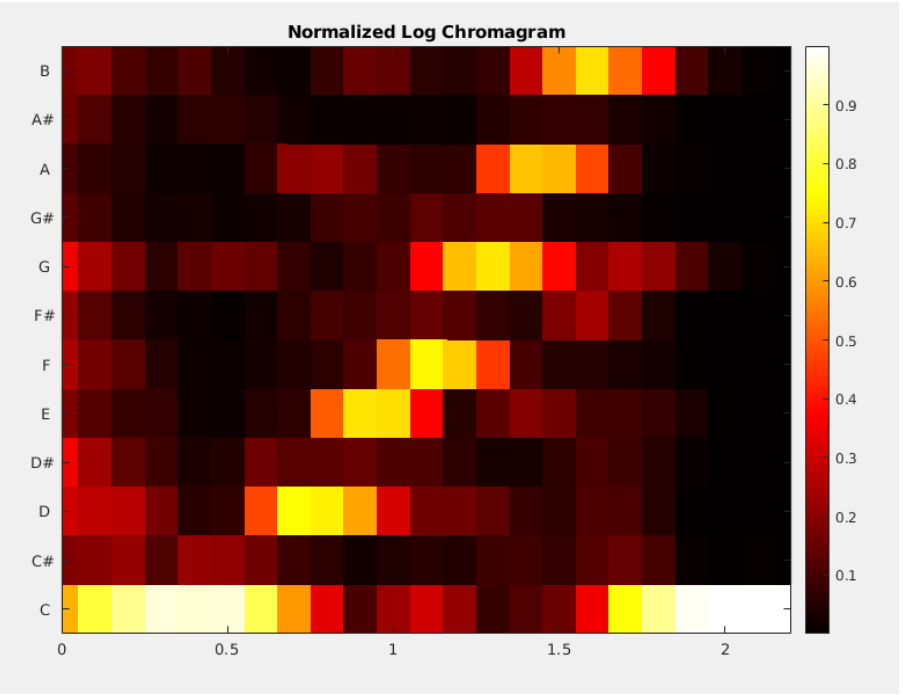
Chroma detection



- The first chord is identified correctly.
- The notes marked in red were wrong
- Am in yellow seems to be correct.

Trying sample audio





A scale C to B identified correctly