

ChordReader

CSE 481 Sound Capstone, Autumn 2016

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Problem Description:

ChordReader is an application that recognize notes and chords played on a piano.

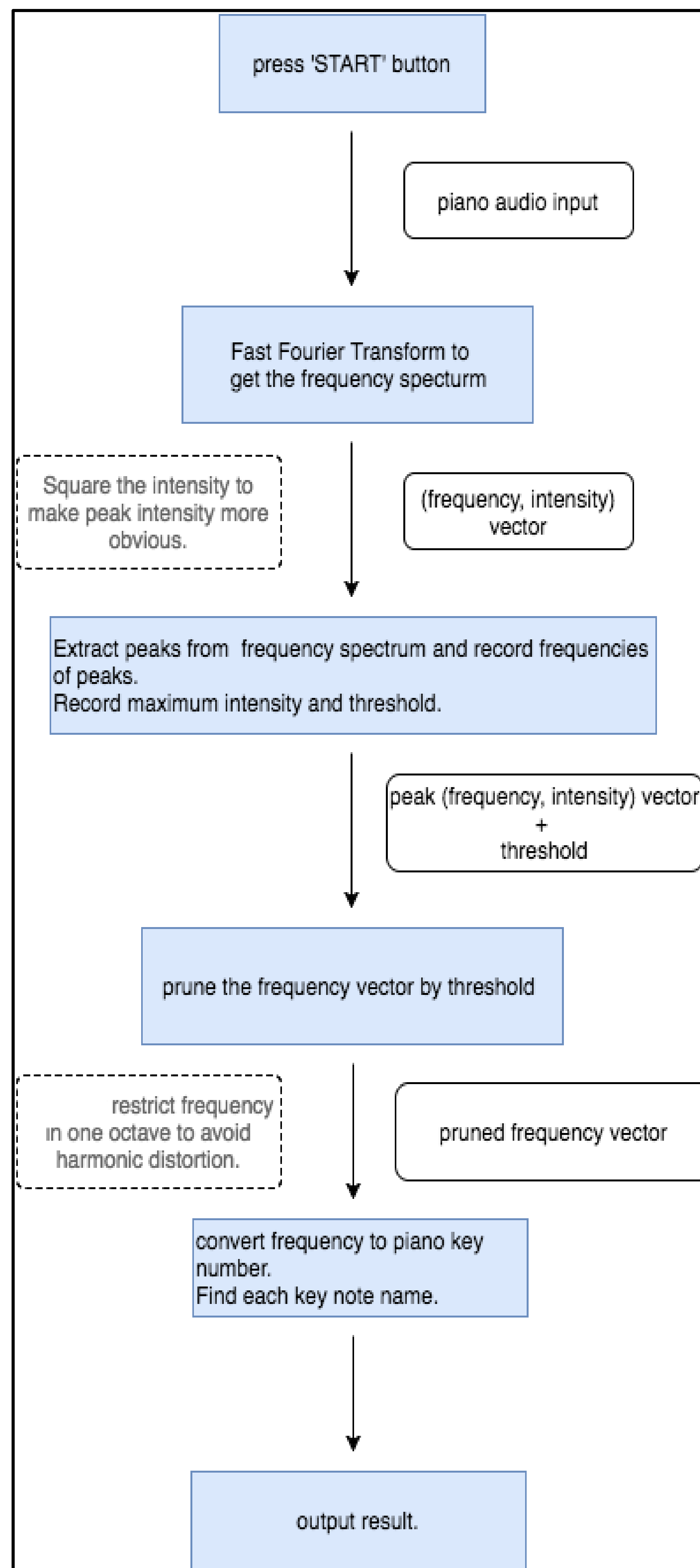
For people working in music business or music learner, chords and notes are what they often deal with. Sometimes it is hard for a beginning music or piano learner to recognize the notes in a piano chord, so it would be convenient for them to have a tool to help recognizing different chords. Inspired by a talk with new piano learners, we created ChordReader!

Use Example:

- Beginning music theory learner who wants to practice knowledge about chords. By using ChordReader, it is easier and convenient for music learner to get the name of each notes consisted in a piano chord.
- Beginning piano learner who wants to know how to play a chord through self teaching. ChordReader can analyze the audio input and give the information about which piano key is played to create this chord, which helps learner to be familiar with the relationship between each note and corresponding piano keys.
- Can be integrated in other music analysis tools in terms of recognizing piano chords through a piece of music.

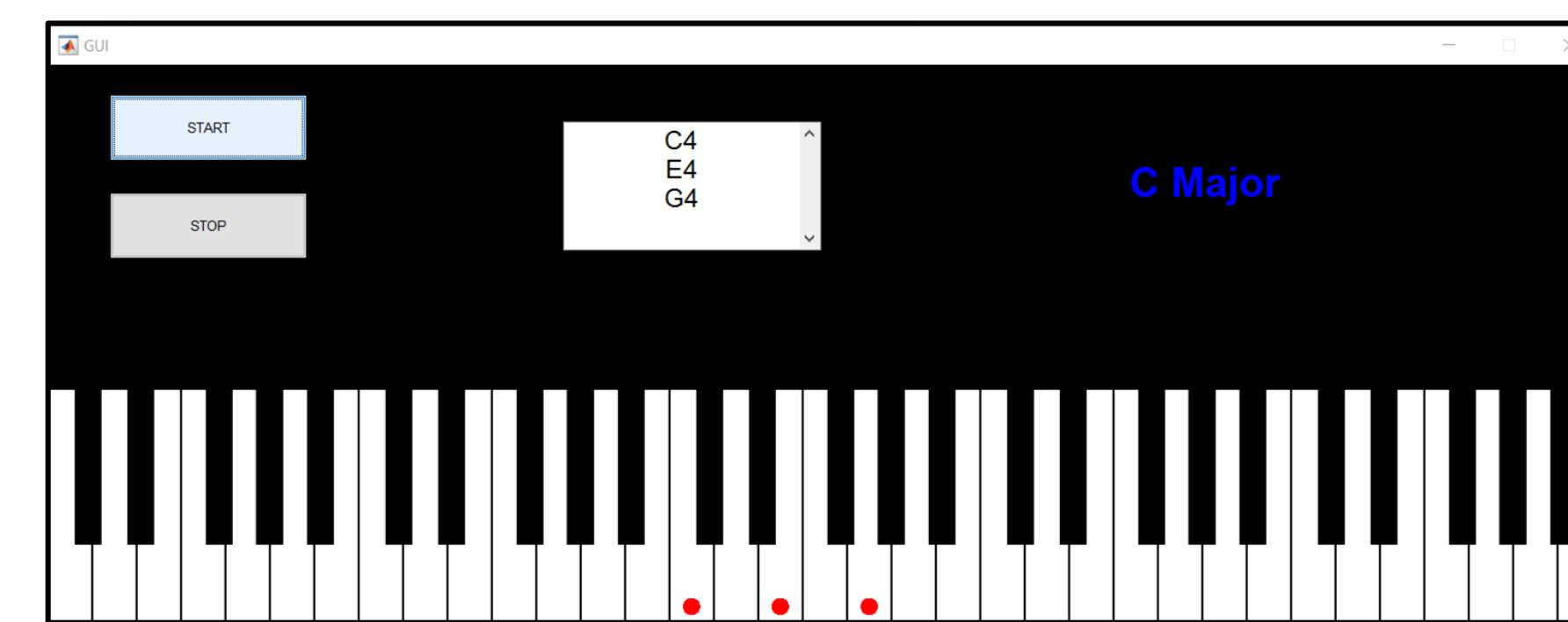
Future Works:

- Noise from surrounding environment and noise created from recording using microphone.
- Detect non-standard sound/chord, for example, when random keys (more than one octave) were played simultaneously.
- Mobile application.

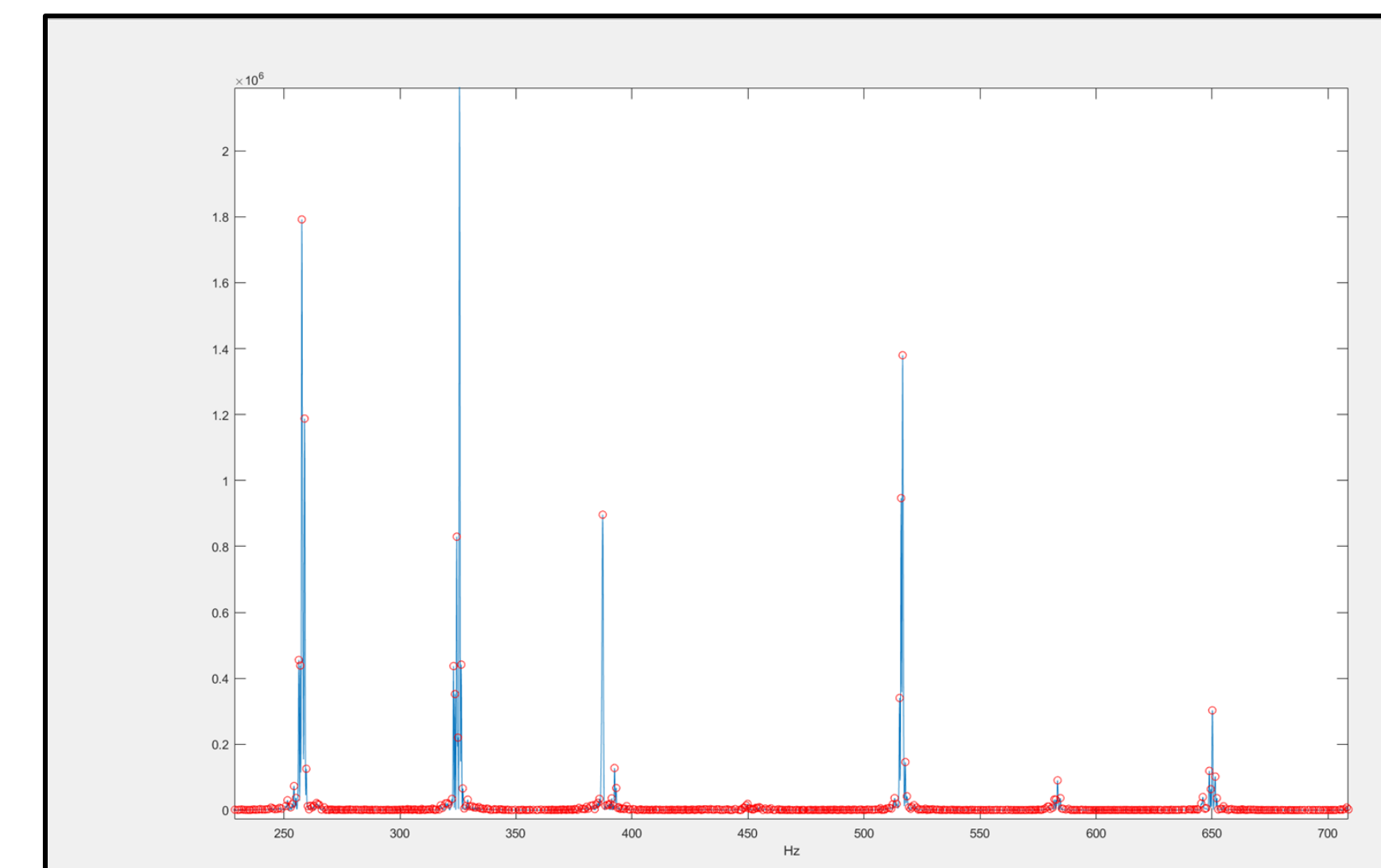


Solutions:

1. User interface:



1. Fast Fourier Transform (FFT), implemented by matlab `fft(X)` function to get the peak frequencies.



1. Convert peak frequencies to piano key number by the following equation.
440Hz = A4 = 49th key on the idealized piano keyboard.

$$n = 12 \log_2 \left(\frac{f}{440 \text{ Hz}} \right) + 49$$

1. Avoid harmonic distortion in audio input.
Since the audio input will always get harmonic distortion, we decided to restrict the output result in one octave from the first peak frequency.