Homework 2 Report

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What I submitted

All files in the prac07 folder downloaded from

http://www.ee.columbia.edu/~dpwe/e4896/practicals.html#prac07

Modified files

- test_sigmund.pd

Additional files

- This report pdf document.
- All audio output files from spectrogram experiments, in a subdirectory called "output".

Instructions

To run the code, please open test_sigmund.pd and just play around with it. You may change the fractalization midi keys (which chord is being played…), the degree of fractalization, and also the input file, amongst other factors.

Goals

I followed the following specification from the assignment page:

Harmonizing - use one input pitch to synthesize several voices at different pitches. Note, to do this in the most "musical" way, the intervals (e.g., a third) should change depending on which note is being sung (e.g., always singing two "white notes" higher).

http://www.ee.columbia.edu/~dpwe/e4896/assignments.html

In this assignment, I used a fractal-based harmonizing method to capture various spectrograms based on different fractal settings and explore the sigmund pitch tracking module.

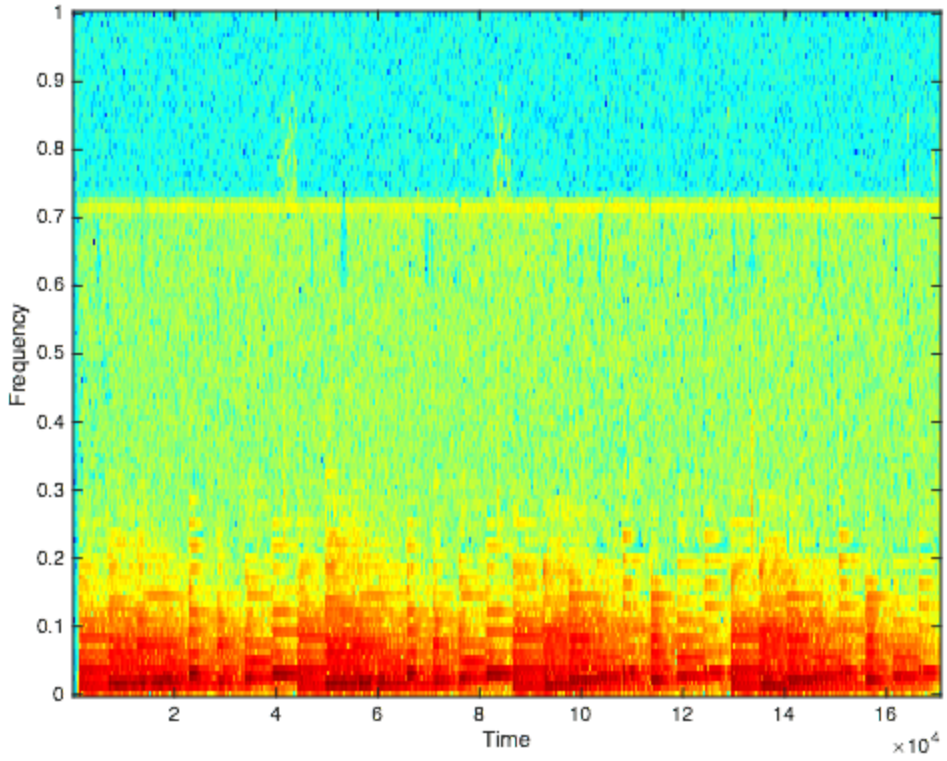
What I did & How it works

I used the 07 practical, note detection. Specifically, I edited just the test_sigmund.pd file to match my requirements.

The following spectrograms follow various experiments that I ran via my patch. The spectrograms all use +5,-2 midi fractalization with phasor~ oscillation. I used the bach piano sample provided in all spectrograms and also I timed when I started/stopped the sampler to analyze the output file.

The way I label the harmonies is as follows:
0 for the pitch-tracked default
+x for the shift up by midi value x
-x for the shift down by midi value x

Fig.0 Piano without pitch tracking



Just a spectrogram of the original piano.wav file for reference.

Fig.1a Note 0 only (left channel)

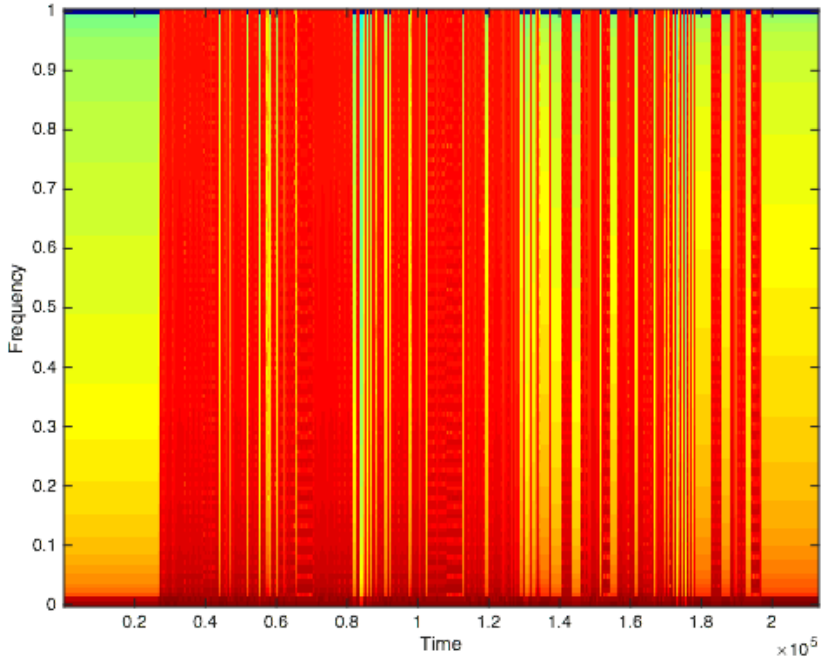
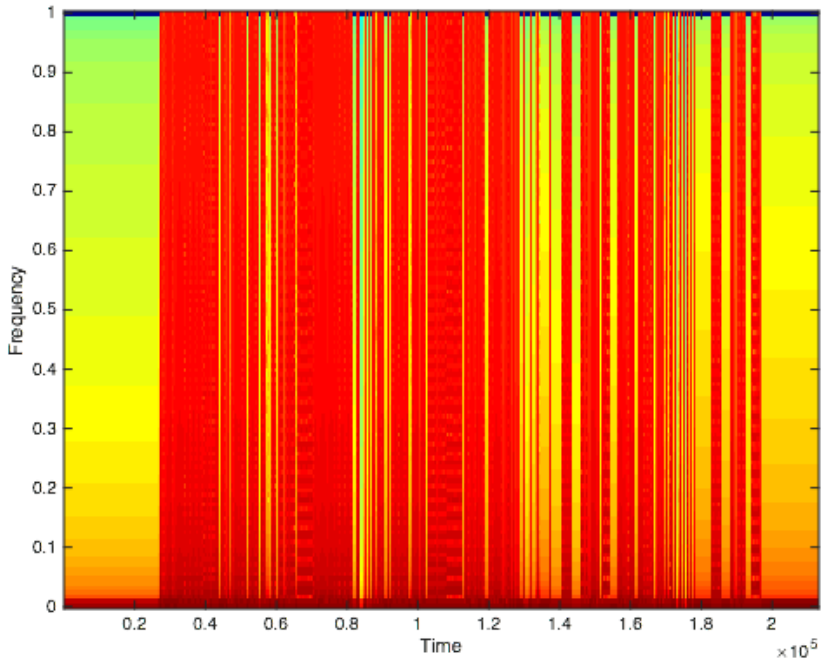


Fig.1b Note 0 only (right channel)



Single-note piano pitch-tracking without fractal-based harmonizing

Fig.2a Notes 0, +5 (left channel)

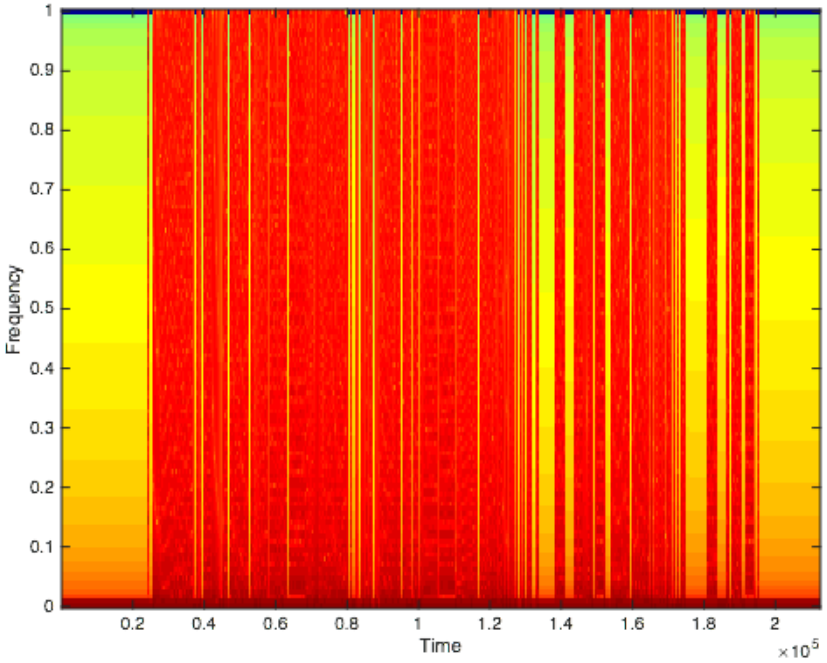
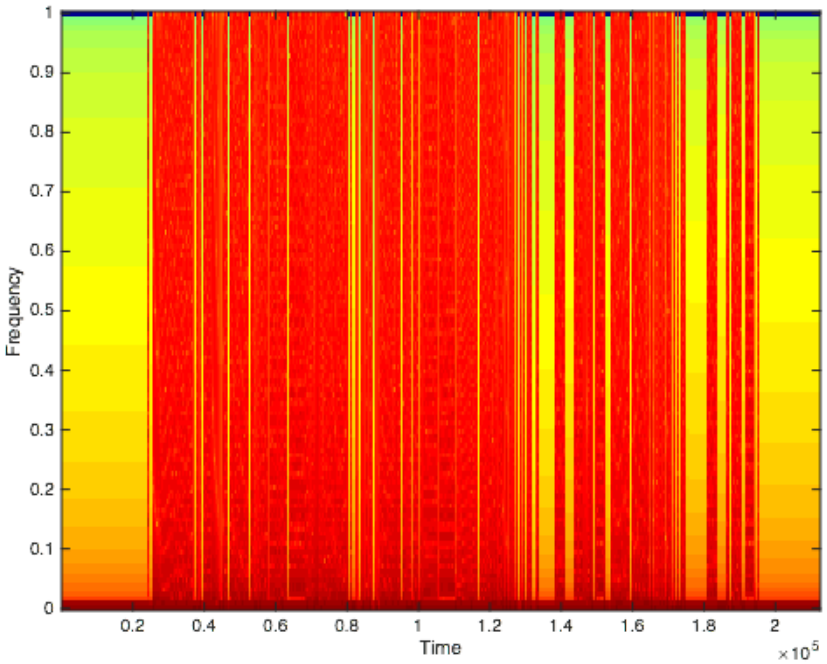


Fig.2b Notes 0, +5 (right channel)



In this spectrogram, we hear the equivalent of the note tracked by sigmund and its third note shifted up in a simple little chord.

Fig.3a Notes 0, +5 & -2 (left channel)

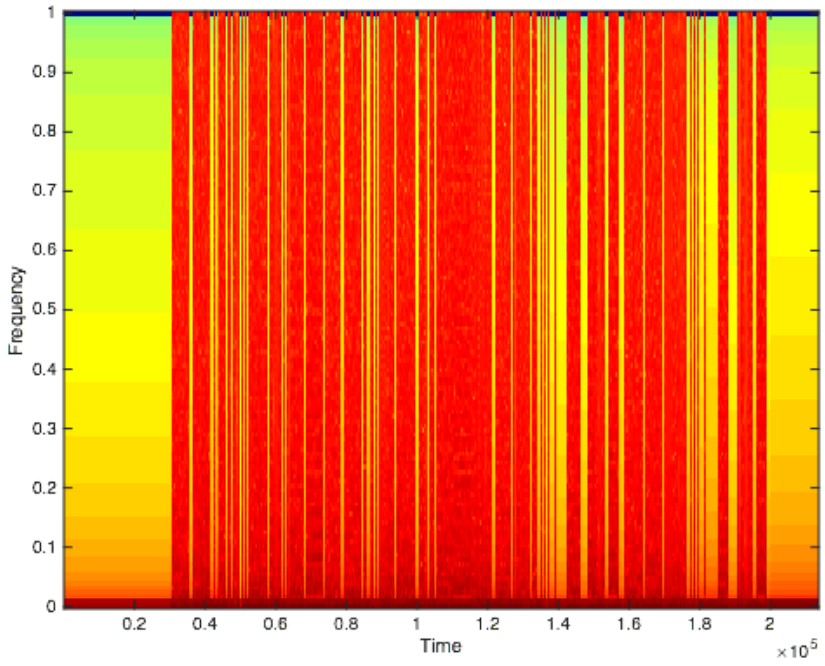
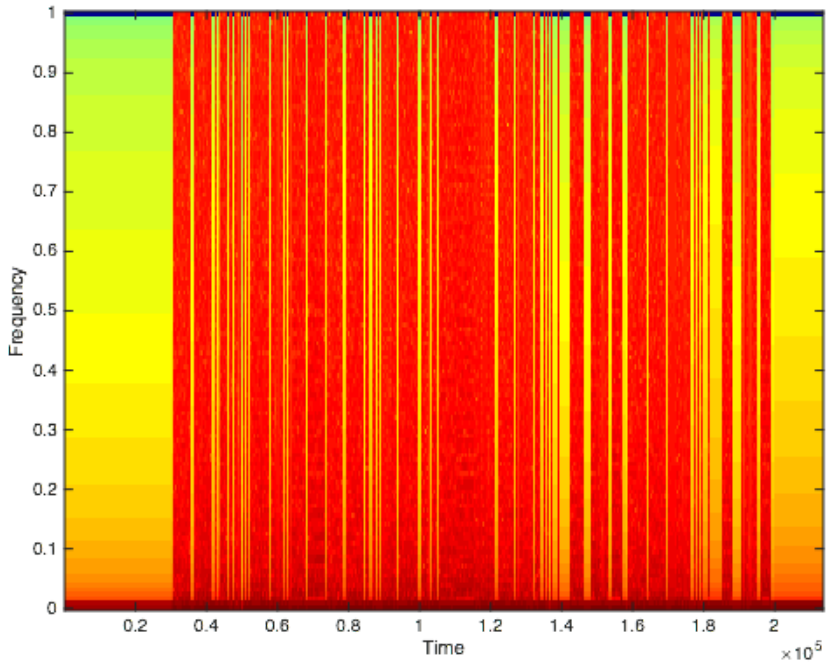


Fig.3b Notes 0, +5 & -2 (right channel)



More chord-tastic beauty.

Fig.4a 0,+5,-2 with Mandelbrot (left channel)

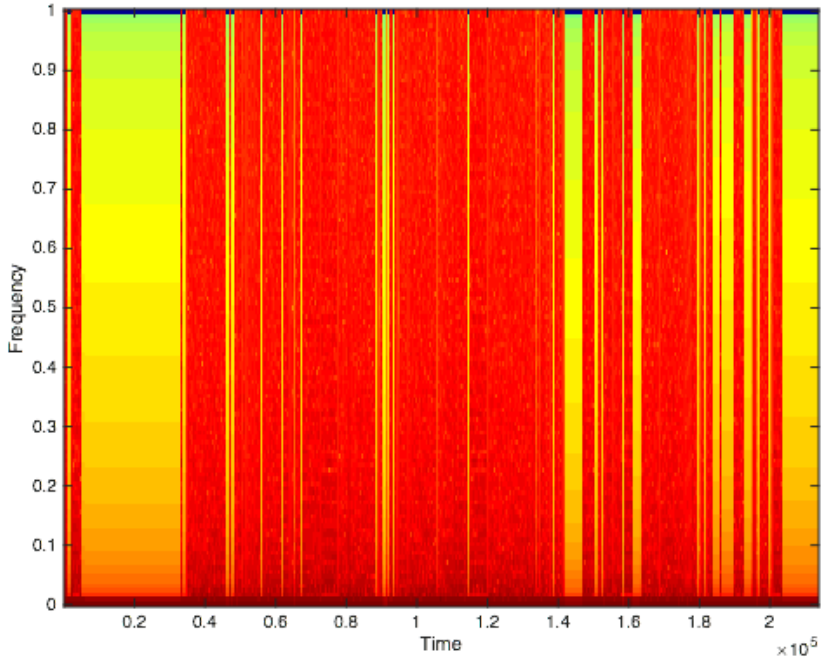
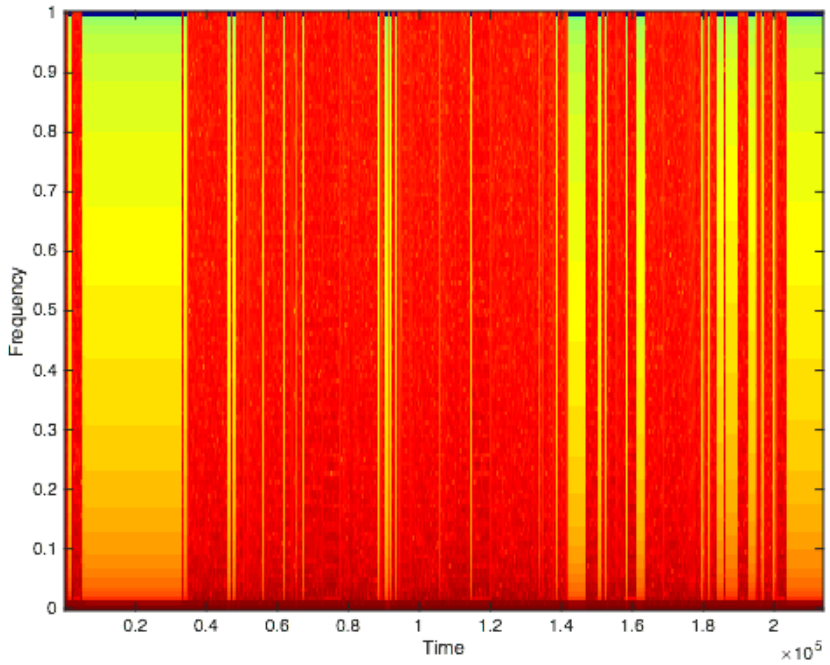


Fig.4b 0,+5,-2 with Mandelbrot (right channel)



Really, really fractalized.

Discussion

As can be seen from the spectrogram analysis, quite a bit of warmth from the sound is lost as a result of the pitch tracking, but the richness of the chord data is apparent.