Etudes for Electronic Ensemble

Beat Matching

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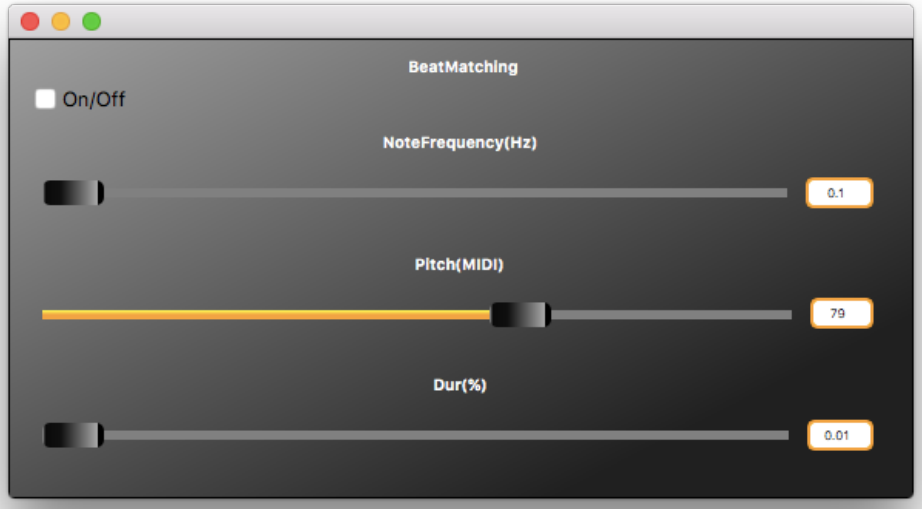
The purpose of this piece is to exercise with flexible control of the tempo and note duration in electronic instruments. By subtly changing the rate of repetition (i.e. frequency) the ensemble can phase in and out of a perceivable rhythmic pattern. This piece is also an opportunity for the students to read and interpret a graphical score as well as thinking musical ideas in numbers.

Software & Hardware Requirements

1. Download and open the software synthesizer required for the piece. There are three ways:
    a. Use an **Android** app *BeatMatching.apk* (most preferred)
    b. Use a **Mac OSX** app after unzipping *BeatMatching.zip* (admin authorization required)
    c. Open *Beatmatching.dsp* in Faust http://faust.grame.fr/editor/ (open using a web browser)
2. Set your device's volume to maximum. Do not connect an external speaker
3. There are one button and three sliders in the synthesizer
    a. ***On/Off*** button starts and stops the synthesizer
    b. ***Note Frequency*** slider determines the rate of the beep. For example, if the value is 5, the synthesizer will beep 5 times per second (i.e. the frequency is 5Hz)
    c. ***Pitch*** is expressed in MIDI note number. Middle C is 60, C# is 61, D is 62, etc.
    d. ***Dur*** is the duration of the note in relation to the Note Frequency. For example, if the *NoteFrequency* is 1 and the ***Dur*** is 0.5, a 0.5 seconds-long sound will beep every 1 second.

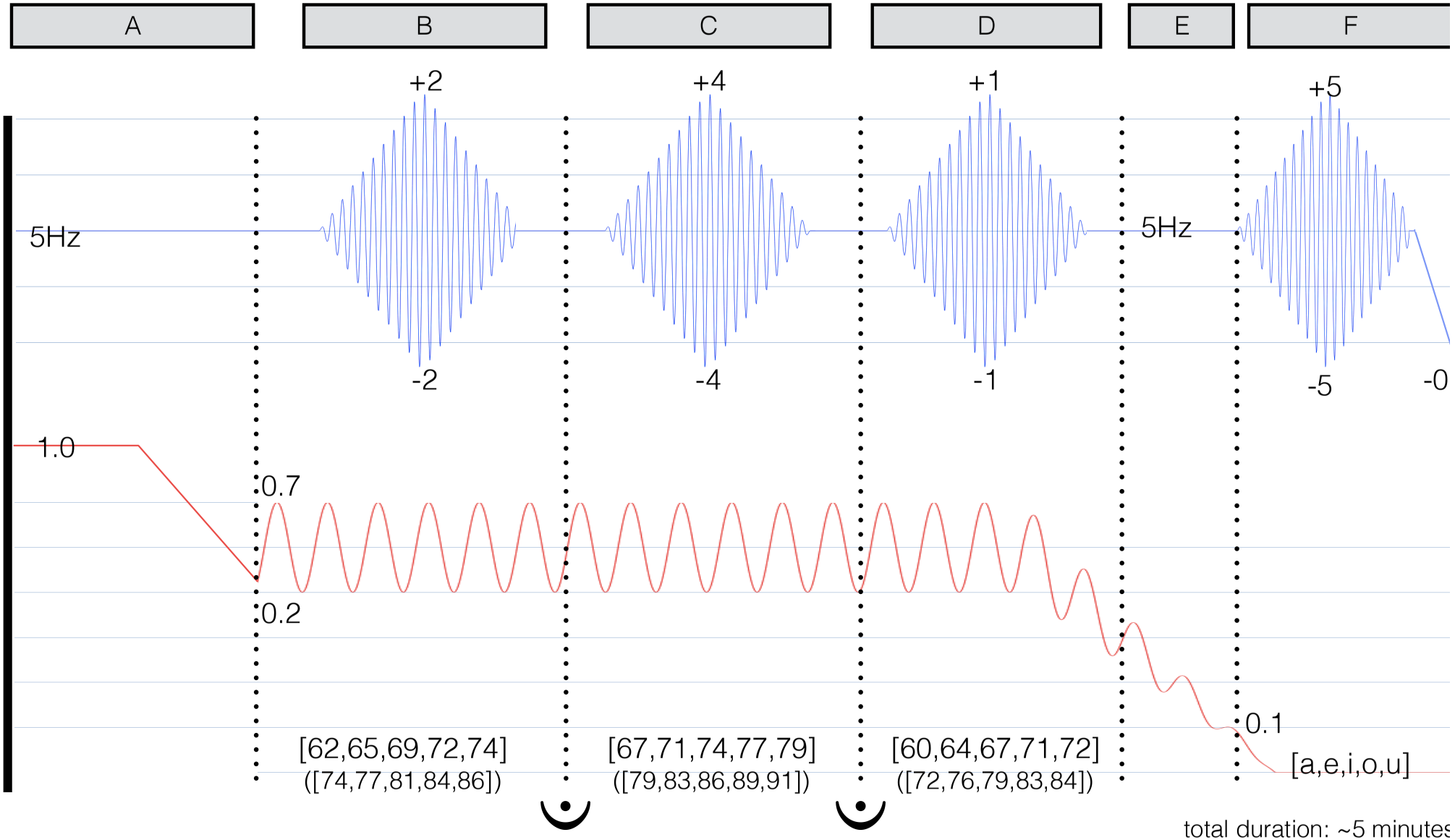
Performance Setup

1. The piece requires a minimum of 4 performers
2. As an initial setting, assign each performer's ***Pitch*** to a **Dm7 or chord** (MIDI note numbers **62, 65, 69, 72, 74**). If there are more than 5 performers, assign them to octave above or higher
3. Assign one leader, who will be in charge of the cues



Performance Instructions: Refer to the graphical score

- The **blue line** represent the amount of change in ***NoteFrequency*** slider over time.
- The **red line** represents the amount of change in ***Dur*** slider.
- **Numbers in brackets [ ]** indicate the possible ***Pitch*** choices for the performers in each section.
- **Letters in brackets [ ]** indicate a special filter technique: place the phone or the speaker to the performer's mouth. Shape the mouth as if one is speaking vowels. The percussive notes of the synthesizer will be filtered according to the mouth shape of the performer.
- Section A: Set **Note Frequency** to 5Hz and ***Dur*** to 1.0. At the leader's cue, turn on the synthesizer (press ***on/off***). At the leader's cue, gradually decrease ***Dur*** to any value between 0.2-0.7
- Sections B, C, and D: At a wiggly line, randomly choose the value of ***Note Frequency*** and ***Dur***. The upper and lower limits of ranges are indicated in each section. For example, a performer can vary the *NoteFrequency* in the range of 3Hz (5-2) and 7Hz (5+2) in Section B. At the end of each section, the ***Note Frequency*** should be 5Hz, and the performers gradually chooses a different **Pitch** value shown in the next section.
- Sections E and F: gradually decrease ***Dur*** to the minimum value. Then, use the special filter technique mentioned above. At the leader's cue, end the piece by gradually decreasing the ***Note Frequency*** to the minimum value and turn off the synthesizer.


A
B
C
D
E
F
+2
+4
+1
+5
5Hz
5Hz
-2
-4
-1
-5
-0
1.0
0.7
0.2
0.1
[62,65,69,72,74]
([74,77,81,84,86])
[67,71,74,77,79]
([79,83,86,89,91])
[60,64,67,71,72]
([72,76,79,83,84])
[a,e,i,o,u]
total duration: ~5 minutes