Introduction to Artificial Intelligence

Assignment 2

Deadline: 20.11.17 23:59

Output: e-mail with the topic "AI Assignment 2" should contain ZIP file called "NameSurname.zip" with code (NameSurname.*), report (NameSurname.pdf) and MIDI-file (NameSurname.midi) should sent to your TA:

- Munir m.makhmutov@innopolis.ru (BS2#1, BS2#3)
- Hamna h.aslam@innopolis.ru (BS2#2, BS2#4)

Programming language: any language

Requests:

- Program must work, code should be readable, should contain English comments
- Report should contain student's name, group, open answers to questions, comments about the code. Also, chosen tonality should be mentioned
- NO extension of a deadline. Works sent after deadline will NOT be evaluated
- NO plagiarism. Plagiarized works will not be evaluated

Task: Generate MIDI file which consists of

1) Any sequence of chords (tonic, dominant and subdominant triads) of the same duration (quarters) in fixed tonality (any of 24 possible major or minor tonalities) without modulations with fixed tempo (120 BPM) and fixed time signature (4/4) using PSO №1
2) Melody for this chord sequence in the same tonality with the same tempo and time signature using PSO №2. There should be no chords inside melody, only sequence of single notes with fixed duration (eights)

Number of bars should be equal to 4. So, output file should contain sequence of 16 chords (4 chords per each bar) and 32 single notes (8 notes for each bar) which should be played simultaneously. Modulation is change of tonality. Mention that space between 7 scale degrees for major and minor tonalities differ (check lecture). Your fitness function should find aesthetically pleasing combination of chords and melody. For correct melody generation, each single note played simultaneously with the chord should have a value which is by modulo 12 equal to one of chord's notes. So, for tonic triad in C major (60, 64, 67) single note's values should be 60+12*N or 64+12*N or 67+12*N. N is an octave difference between chords and

melody. Chords represent accompaniment for melody. In this assignment consider that accompaniment should be lower than melody on 1 or more octaves. Consider that dissonant intervals are not aesthetically pleasing. Each interval has a different measure of aesthetic enjoyment. There should be no continuous repetitions of the same chords (maximum 4). Possible midi note values are in the range [48,96]. Better to use lower values for chords. Difference between neighbor notes should not exceed 12. Difference between lowest notes of neighbor chords also should not exceed 12.

You should also provide a report with explanation of used parameters, representation of particle structures and fitness function explanation for both PSOs. Report should contain used input values for PSOs: particle amount, spent time, generations used to get the output.