Synth Challange Report

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1 Composition

For the obligatory part I chose Dvorak's Symphony no. 9. Used instruments in the midi are flute, clarinet, piano, cello and two violins.

The subsections describe used techniques for the individual instruments

1.1 Clarinet

Clarinet is synthesised with wave envelope modeling and frequency modulation where the modulation frequency is frequency of the note multiplied by 0.667.

1.2 Piano

For the piano I tried to use additive synthesis using 4 harmonics. From those harmonics an envelope is made, which is used for modulating a sine wave. The harmonics are dependant on note duration in order to prevent discontinuities with shorter note lengths.

1.3 Cello + Violins

For the bowed string instruments I chose formant synthesis to simulate the sounds. In both cases the original signal is a sawtooth wave. Formats for both violins are at frequencies F= [500, 1500,3000,4000]; with bandwidths BW=[300, 200,700,1500]; and for cello at frequencies F=[990, 2000]; and bandwidths BW=[450, 560]; Using those frequencies and bandwidths the

excitation signal is filtered and multiplied with an envelope, which differs for violin and cello.

1.4 Flute

Here I used a simple wave envelope modeling. I tried to make an envelope similar to an envelope of flute and modulate different type of waves with said envelope. The sound with sawtooth seemed to be more real than sine or rectangular waves.

2 Major Scale

For the scale I decided to synthesize one more instrument (bass guitar) to cover more notes. One instrument covers one of 3 octave with notes from c2 to c5. Clarinet and violin were synthesized using the methods described above. Bellow we can see which instrument plays which octave.

Bass - c2-c3

Clarinet - c3-c4

Violin - c4-c5

For the bass synthesis I used additive synthesis similar to piano, with 5 harmonics and different shapes.

3 Custom sound

For the custom sound I wanted to make sound of helicopter or a drone. For the task I used granular synthesis to obtain the resulting sound. First the parametrs of the grain are set. In 2 cycles those grains are built and multiplied by a cosine wave. The resulting signal from this loop is multiplied by uniformly distributed noise. Curiously multiplying the signal with normally distributed noise doesn't give the same result.

References

[1] Synth Challenge 2020 Midi files. Available at: *https://moodle.fel.cvut.cz/course/view.php?id=5602*

[2] Author's notes