

Report for Lab 1: Elementary Sound Synthesis

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1 EXECUTIVE SUMMARY

This lab is about implementing different methods of synthesizing the signals, such as amplitude scaling the signals and time scaling the signals.

2 EXERCISE #1: SYNTHESIZE THE PIECE OF A SONG

2.1 DESCRIPTION

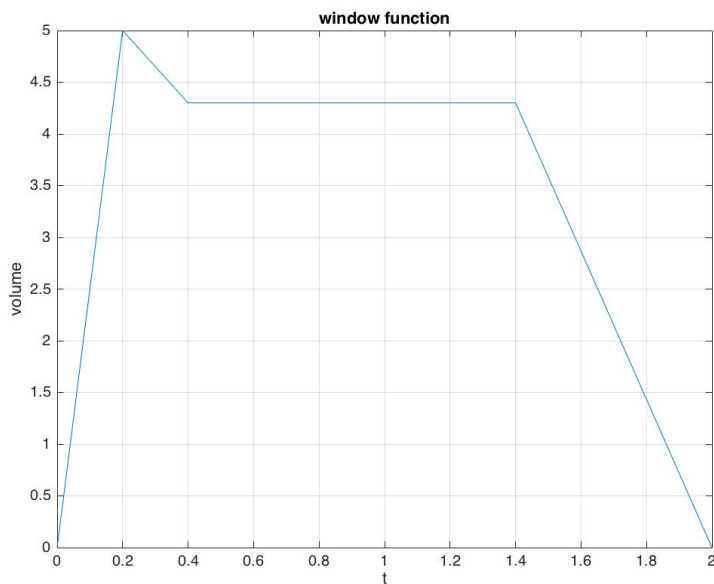
In this part, I first created each note with a sinusoidal function based on the frequency and duration of each note. Then I combined the notes together with some period of silence in between to form the piece of the song.

3 EXERCISE #2: AMPLITUDE OPERATIONS

3.1 DESCRIPTION

In this part, I improve the quality of the sound by multiplying the original signal with a window function.

3.2 PLOTS



10% of the length of the node is attacking part(A);

10% of the length of the node is decaying part(D);

50% of the length of the node is sustaining part(S);

30% of the length of the node is releasing part(R).

The amount of overlapping that I used is 150.

4 EXERCISE #3: RANDOM NOISE SIGNAL

4.1 DESCRIPTION

In this part, I used "randn" Matlab command to create a noise signal.

4.2 ANALIZATION

Frequency: 300 Hz;

The higher frequency generates a smoother sound. When the frequency is very low, then the sound will be disjointedly. But, when the frequency is much higher, then the sound is more continuous.

Decay factor: $e^{-t/3}$;

If the denominator of the power of the exp. function is larger, the sound will last longer before die out.

5 EXERCISE #4: TIME SCALING

5.1 DESCRIPTION

In this part, I applied time-scale modification on the signals.

5.2 ANALIZATION

Time scaling factor: $2/5$;

The time scaling factor is less than 1, so it interpolates some samples to the original signal. After the interpolation, the frequency of the signal decreases and the pitch becomes lower. So the modified cat sound sounds like the tiger sound.