Seminar 2 - Designing of complementary filters for sound record

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January 4, 2021

1 Abstract

First I will introduce the task, and why I picked it, afterwards I describe my methods, and any problems I ran into. I worked with MatLab as it is the best tool to do sound filtering that I know of. At the end I describe the results and my findings regarding the task.

2 Introduction

I picked Designing of complementary filters for sound record, because it was one of the most interesting sounding options. I also wanted to try sound filtering as I did image processing in the first Seminar. The task posed some interesting problems that I was eager to solve.

3 Methods

I completed the task using MatLab, as it has a lot of built in functionalities, which I can use to make my job easier. I wrote it as a function requiring no parameters, but I need the original Yesterday audio file in the current folder. The most important part of the exercise wast using the function "fir1", as it enabled me to create lowpass and highpass filters.

Both filters were created similarly. First I needed to use audioread to get the recording, first I set two separate boundary frequencies one for the lowpass filter at 290 Hz, and another at 380 Hz for the highpass filter. I then used fir1 three times each to get the filtered result at lengths of 101, 201 and 301. Afterwards I only needed to use the created filter on the original recording to get the results.

4 Results

When displaying the given results it is clear that the lowpass filter has gotten rid of high frequencies and the highpass filter has gotten rid of low frequencies. From the amplitude spectrum I can discern a similar result, as the lowpass filter gets rid of high and the highpass filter gets rid of low frequencies.

When listening to all the different resulting audio files, it is obvious that a higher length gives you better filtering, as it gets rid of more of the wrong frequencies. When I listened to the 101 length songs I could still hear some of the wrong frequencies, however, when listening to 301 length songs the wrong frequencies really just aren't there.

5 Discussion

From this task I have discovered just how well MatLab works when creating filers. I also learned how to make a good filter if I ever wanted to filter out low or high frequencies, because I know to use the higher length.