

ELEC-A5204 Homework 6

4.9.2019

Answer to all questions in given Matlab files and use Matlabs publish feature to generate a pdf file. Always return the published pdf AND Matlab files. When an exercise ask you to draw figures, return them always with suitable axis labels and titles.

1 Reverberatio

Record some interesting locations impulse response (local church, your bathroom/livingroom, lecture hall, guildroom...) (for example with you phone). Or you can use 'LoveLibrary.wav' from this folder. Import your IR to Matlab and exam it and use it to add reveberation to 'Guitar.wav'. Make sure that your IR and 'Guitar.wav' has the same sampling frequency by using `resample()` if neaded to convert your IRs samplerate.

Write down what impulse response you used and how you got it.

1. Import audios and match samplerates.
2. Plot your IR and one sided magnitude and phase responses. Analyse spectrums with couple of sentences. (You can smooth the the plot by lowpass filtering the response.)
3. Add reverberation (IR) to Guitar.wav by using convolution and play it. Can you hear a difference between this and original signals?

2 DTMF-coding

One can hear dual tone multi frequency (DTMF) signale.g. in traditional phone or mobile phone when number buttons are pressed. DTMFsignals are sum of two sine components; lower and higher.

$$x[n] = \cos(2\pi(f1/fT)n) + \cos(2\pi(f2/fT)n), \quad (1)$$

lower frequencies 697, 770, 852, 941 higher frequencies 1209, 1336, 1477.

	1209 Hz	1336 Hz	1477 Hz
697 Hz	1	2	3
770 Hz	4	5	6
852 Hz	7	8	9
941 Hz		0	

Implement function that takes phone number as a string and returns DTMF vector. Check file `myGenDTMF.m` in MyCourses and write the missing rows in switch-case structure. Make sure that your code works! Return your source code and spectrogram of your signal.