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Project #1

In this project you need to write a python or Matlab script (or Simulink) that does the following:

- 1- Read an audio signal from an audio file (.wav format),
- 2- Plot the audio signal in the time domain,
- 3- Determine the Energy of the audio signal,
- 4- Determine and plot the frequency spectrum of the audio signal,
- 5- Determine the X% Energy Bandwidth of the audio signal,
- 6- Apply the audio signal to a Low Pass Filter (LPF). The bandwidth of the LPF is the X% Energy Bandwidth of 5.
- 7- Determine and plot the filtered audio signal in the time domain,
- 8- Write the filtered audio signal to an audio file (.wav format),

After executing the above script, try to play the filtered audio signal using any player in windows/Linux. Is there a difference between the original audio signal and the filtered one?

You may work in a group of at most three students. Write a three pages report to present and discuss your results. Submission due date is on the 13th of April, 2019. Discussion date will be announced later.

The table below includes some X% Energy Bandwidth values for different audio files (attached to this memo). You may use these values to validate your code.

Table 1: X% Energy Bandwidth for different audio files

X%	Summer.wav (KHz)	Counting.wav (KHz)	Athan1.wav (KHz)	SunnyDay.wav (KHz)
95%	2.345	1.556	1.5	6.5
90%	2.008	1.089	1.461	3.81
85%	1.777	0.721	1.445	0.266
80%	1.593	0.613	1.206	0.088
75%	1.584	0.523	1.149	0.059
70%	1.579	0.485	1.037	0.029
60%	1.555	0.411	0.892	0.016
50%	1.519	0.34	0.867	0.014
40%	1.408	0.214	0.778	0.012