

Exercise on audio processing in Matlab (basic). IMPORTANT: Retrieve headphones to better listen to the audio signals

Goal: to understand the effects of the same processing performed on images on audio signals.

- 1) Download or register an audio file in one of the format which can be taken as input by Matlab (i.e., .WAV)
- 2) Perform a dct on the audio signal, plot the coefficient.
- 3) Threshold the dct coefficient trying different thresholding schemes and recover the signal. Listen to the signal to understand the effects.
- 4) Perform a wavelet transform on the audio signal, plot the coefficient.
- 5) Threshold the wavelet coefficients trying different thresholding schemes and recover the signal. Listen to the signal to understand the effects. (Hints: try as first experiment, to discard a complete band)
- 6) Try to use dct or wavelet to denoise the audio signal. If the audio signal is not noisy (i.e., it is not the result of a recording) add a noise to the original signal.
- 7) Plot the spectrogram of the signal

(hint see the browser help page under the voice wavread, spectrogram and related functions). vSe also <http://www.ee.columbia.edu/ln/rosa/matlab/> to find other code to read other formats (i.e., mp3).

VERY ADVANCED EXERCISE: Do you know Shazam?

Connect to URL

<http://www.ee.columbia.edu/ln/rosa/matlab/>

and try to experiment the code at the first case “[Robust landmark-based audio fingerprinting](#)”, in order to discover how Shazam works. Prepare a brief presentation of 20 minutes (or more, to be accorder with the teacher) to explain the core of the algorithm of Shazam and to show a simple example of coding (in Matlab or Octave).