UNIVERSITY OF CRETE
DEPARTMENT OF COMPUTER SCIENCE
Multimedia Technology
Spring 2018

3rd assignment

An audio signal of one piano note is given. It is asked to determine the 'Note on' and the 'Note off' time moments and to recognize the note. The detection of the starting and ending moments will be based on the computation of the amplitude envelope on frames of 10 *msecs*. The amplitude envelope is approximated by the square root of the average signal power in non-overlapping time frames. It will be considered that the note is 'on', when at first the amplitude is at least 0.03 of its maximum. In the same way it will be considered that the note is 'off', when at last the amplitude is larger than 0.03 of its maximum.

On the signal detected the Fourier transform will be computed in order to find its harmonic components. Find the location of the first peak (lowest frequency) f_0 of the magnitude of the Fourier transform, among the peaks which are at least at 0.25 of the maximum value of this magnitude. f_0 will be the estimate of the fundamental frequency of the note. It is then asked to produce the audio signal composed by the fundamental frequency and the four harmonics with larger power. The results on estimating the music features should be compared to the ground truth. The report of the whole homework should be given in HTML.

Remind : The notes are annotated by integers according to the fundamental frequency f_0 in Hz

$$p = 69 + 12 \log_2 \frac{f_0}{440}$$

Useful Matlab functions : *audioread, find, findpeaks, fft*
Data, music signals and ground truth for note features, are given in

`http://www.csd.uoc.gr/~hy474/data/ISOL.7z`