

Digital Signal Processing

2nd Laboratory Session

1. Introduction of working environment: Ubuntu 14.04, Matlab/Octave, Audacity.
2. Introduction to relevant data files and records that will be used during laboratory sessions, databases available on Physionet webpages.
3. Introduction to Matlab:

Tasks:

- (a) Let $x = [4, 1, 6, 8, 2, 7, 9]$ be a vector. What do the following commands do?
 - $x(3)$
 - $x(1 : 5)$
 - $x(4 : end)$
 - $x(end : -2 : 1)$
 - $x([1, 5, 3, 2, 2])$
 - $sum(x)$
- (b) Create a vector containing even numbers between 15 and 49.
- (c) Let $x = [2, 9, 7, 5, 3]$ be a vector.
 - Subtract 11 from each element in vector x .
 - Multiply each element in vector x by 2.
 - Square each element in vector x .
 - Transpose vector x .
- (d) Let $x = [3, 2, 6, 8]'$ and $y = [4, 1, 3, 5]'$ be column vectors.
 - Add the sum of elements in vector x to each element in vector y .
 - Element-wise exponentiate vectors x by vector y .
 - Element-wise divide vector x by vector y .
- (e) Generate a vector z containing all zeros, vector o containing all ones and vector r containing random numbers between 0 and 10. All vector should be of length 50 samples.
 - Plot vectors on the same figure with different colors using command *plot*. Make another figure using command *stem*.
 - Gather both results and plot them on the same figure using *subplot*.
- (f) Let $M = [2, 4, 1; 6, 7, 2; 3, 5, 9]$ be 3×3 matrix.
 - Generate a submatrix containing first two rows.
 - Sum elements of matrix M in each row and in each column.

There are different ways of solving this task.

- (g) Load following built in files in Matlab *gong.mat* and *handel.mat*. (If using Octave load following files, available on the webclassroom: *gongM.mat* and *handelM.mat*)
- Listen to them using *soundsc* in Matlab.
 - Save them in *wav* format and listen to them in Audacity.