
Use MATLAB (MATrix-LABratory) for exercises.

1. Read the given MP3 file and get the samples and sampling frequency using command $[y \ f_s] = \text{audioread}(\text{filename});$
 - i. Plot for 2 sec with respect to the sampling frequency (f_s).
 - ii. Convert the samples in vector (y) to matrix (Y) by using command $\text{reshape}();$
 - iii. Convert the following in to the *wav* file using command $\text{audiowrite}(\text{filename}, \text{desired samples}, \text{sampling frequency});$
 - iv. Play audio by using $\text{sound}(\text{variable}, \text{sampling frequency});$
2. Read the image given using $I = \text{imread}(\text{filename})$ command.
 - i. Separate Red, Green and Blue pallets from the image and show them using $\text{imshow}(\text{variable});$
 - ii. Convert the color image to gray scale image and observe the difference between the pallets and gray scale image.
 - iii. Convert the image samples from matrix in to vectors using $\text{reshape}();$
 - iv. Resize your image in to your intended dimensions using $\text{imresize}();$
3. Read the given MP4 video file using $V = \text{videoreader}(\text{filename});$
 - i. Calculate the number of frames received in the variable.
 - ii. Collect the frames up to 2 sec duration and convert them back to the avi video using $\text{videowriter}(), \text{readFrame}()$ and $\text{writeVideo}().$
 - iii. Convert the each frame in to column and store it another variable and show it as image.
4. Read the passage given in the excel sheet using $[\text{numstr}] = \text{xlsread}(\text{filename})$ and convert it in to the ASCII values using $\text{char}()$ and $\text{double}().$ Now by reordering array of ASCII values in to matrix of your dimensions and convert in to image.
5. Convert the audio samples of first 3 sec extracted in 1 (a) to the ASCII values using $\text{num2str}(), \text{char}()$ and $\text{double}().$ Finally reshape the array of ASCII values and convert it to image.
6. Take the 2 sec audio samples and compute the floor, ceil and round and find the error between the original 2sec audio samples and resultant samples of *floor*, *ceil* and *round*.
7. Perform the block convolution:
 - i. Read the audio signal (*Signal_Processing_Audio.mp3*).
 - ii. Extract the signal for 5 sec duration (estimate the length of the sequence) and considered it as $x(n).$
 - iii. Now, Calculate the outputs for the given impulse responses $h_1(n), h_2(n)$ of length 61 each (stored in .mat files $h1, h2$) using **Overlap-add method** (Divide the input signal $x(n)$ into multiple blocks with each size of 512).

MATLAB Commands:

**audioread(),audiowrite(),sound(), imread(),reshape(),imshow(), imresize(),videoreader(),
videowriter(), readFrame(), writeVideo(),hasFrame(),xlsread(),xlswrite(),char(),double(),
num2str(),floor(),ceil(), round(), conv()**