

## Assignment 1

Course: DSAA, Monsoon 2017 @IIITS

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### Problem 1.

Process of recording, file format conversions, Matlab functions used for reading and plotting the voice data.

Solution:

### PROCEDURE:

- First record an audio through any electronic device like smartphone, mobile, laptop.
- Then convert it into .wav file using any audio file convertor (for example, Freemake Audio Convertor).
- We store the .wav file in the workspace of Matlab.
- We read the audio file in Matlab using `wavread('filename')`. Let the recording be 'sample.wav'.

Syntax:     `>>> x = wavread('sample.wav');`

- To plot the data read by Matlab, use subplot function to divide the plotted area so that we can plot left and right channels of the audio file read, in a single jpeg file itself.

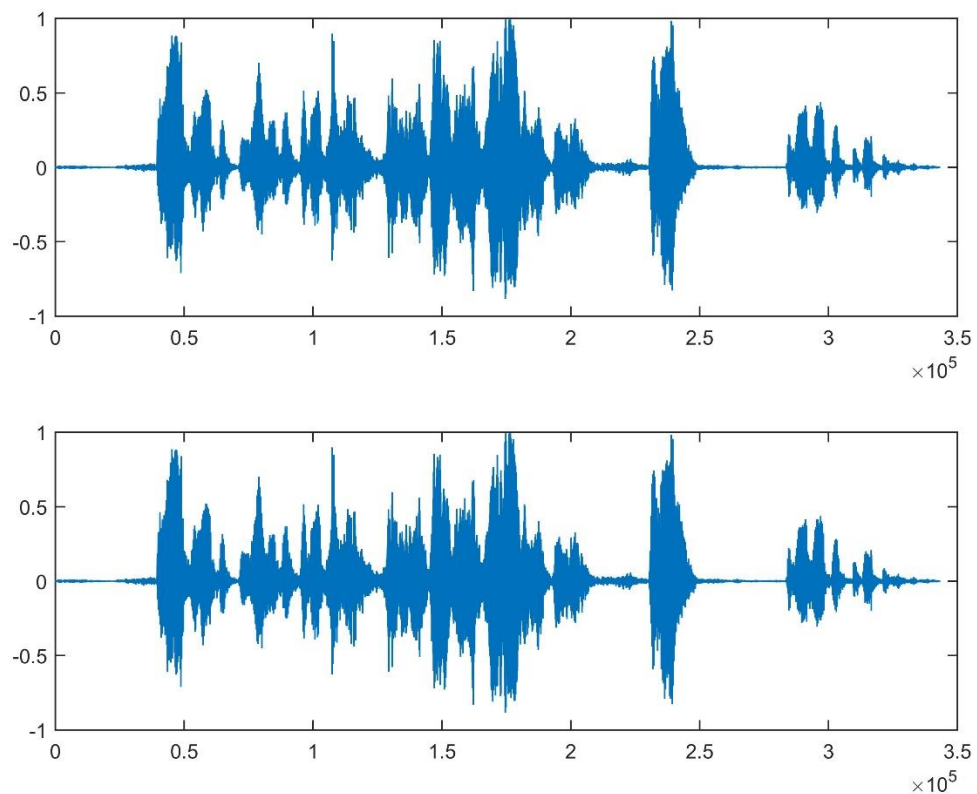
Syntax:     `>>> subplot (2, 1, 1);`  
                 `>>> plot (x ( : , 1));`  
                 `>>> subplot (2, 1, 2);`  
                 `>>> plot (x ( :, 2));`

- The above syntax results in division of the plot into two equal parts, each of which contains left and right channel respectively as shown in the observation part.
- Finally, to export the image data to an external file, use the syntax as depicted below:

Syntax:     `>>> print -r500 -djpeg 'Recording.jpg';`

### OBSERVATIONS:

- We observe an irregular graph depicted in the form of a r500(high resolution image) by name "Recording.jpg".
- Therefore we can use Matlab to study every minute data of the audio recorded.



**Figure 1: Audio channels as depicted by graph**

## **Problem 2.**

**Process of imaging and Matlab functions used for reading and displaying the image data.**

**Solution:**

### **PROCEDURE:**

- Foremost we need to capture an image using the front camera of any electronic device like a laptop, mobile, etc.
- After capturing the necessary image, we save it in the laptop, particularly in the workspace of Matlab so that we can work on it easily.
- We use the `imread` function to read the image data, let the file required be processed be "Capture.jpg".

**Syntax:** `>>> x = imread('Capture.jpg');`

- This stores the data read by Matlab in the form of a large matrix containing values, which can be seen after the above command is sent to the computer.
- We can use `imshow` to show the image that has been read by Matlab.

**Syntax:** `>>> imshow(x);`

- This ends up showing the captured image. To export the image to a file, input the following command.

**Syntax:** `>>> print -r500 -djpeg 'Sample.jpg';`

- The image gets exported to a .jpg file named “Sample” in the workspace folder set as follows.



Figure 2: Sample.jpg

- To obtain the histogram of the above image, input the following command.

**Syntax:** `>>>imhist(rgb2gray(x));`

- To export the histogram image, type the similar command as already used above.

**Syntax:** `>>>print -r500 -djpeg 'Histogram.jpg';`

- Thus, the histogram is exported to the workspace with the filename “Histogram.jpg” as depicted below.

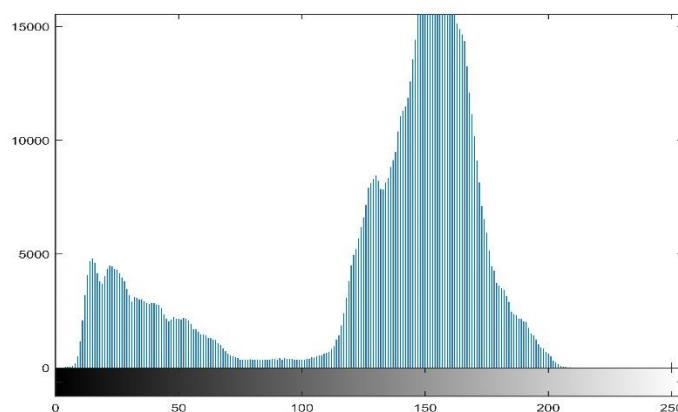


Figure 3: Histogram.jpg

#### OBSERVATIONS:

- While reading the image file, many numbers appear in the command window, which indicates that the image data is read by Matlab in the form of a large matrix.
- We observe that Matlab processes the image data that is read and exports it in the form of a high resolution(r500) .jpg file to the workspace, like the original file using the print command.
- The command ‘rgb2gray’ converts TrueColor image to grayscale intensity apt for histogram.
- We observe an irregular graph when the image is depicted in form of histogram.

#### What have we learnt?

We have learnt the basics of Matlab and how it can be used to study the characteristics of an image or an audio file, which is useful for higher studies.