

# Practical 1

## Aim - Displaying Grey Scale Image

### Theory

- 1] MATLAB Stands for Matrix Laboratory. It is a high-performance language that is used for technical computing.
- 2] It was developed by Steve Motor of the Company Mathworks in the year 1984.
- 3] It is written in C, C++, Java.
- 4] It allows matrix manipulation, Plotting of functions, Implementation of algorithm & Creation of user interfaces.

### Basic functions in MATLAB

- 1] `clc`: It is used to clear the Command Window.
- 2] `close all`: It is used to close all graphic windows.
- 3] `clear all`: It is used to clear all variables.
- 4] `imread`: This function reads images from the graphic files.
- 5] `rgb2gray`: It converts the truecolor image RGB to the grayscale image.
- 6] `subplot(m,n,p)`: It divides the current figure into an  $m$ -by- $n$  grid and creates axes in the position specified by  $p$ .

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## Practical 2

### Practical 2A

Aim - Brightness Adjustment.

#### Theory

- 1] The brightness of an image depends on the value associated with the pixel of the image.
- 2] When changing the brightness of an image a constant is added or subtracted from the intensity of all samples value.
- 3] If we add a positive constant to all of the image pixel values make image brighter.  
Increasing the brightness :  $g(m, n) = f(m, n) + k$ .
- 4] If we subtract a positive constant from all of the pixel values to make the image darker.  
Decreasing the brightness :  $g(m, n) = f(m, n) - k$ .

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## Practical 2B

Aim - Image Negation

### Theory

- 1] It is also called as Inverse Transformation which reverse light and dark.
- 2] A negative image is obtained by subtracting each pixel from the maximum pixel value.
- 3] For an 8bit image the negative image can be obtained by reverse of grey level according to the transformation
$$g(m, n) = 255 - f(m, n)$$
- 4] Negative images are useful in the display of medical images and producing negative prints of image.



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practical 3

practical 3A

Aim - Contrast Adjusting

Theory

- 1] Contrast adjustment is done by scaling all the pixels of the image by constant  $K$   
$$g(m, n) = f(m, n) * K$$
- 2] changing the contrast of an image changes the range of intensity values present in the image.
- 3] Specifying the value above one will increase the contrast by making bright samples more brighter and dark samples more darker.
- 4] Specifying the value below one will do the reverse operation.

## practical 3B

Aim

Theory

- 1] Thresholding is required to extract a part of an image which contains all information.
- 2] Thresholding is a part of a more general Segmentation problem.
- 3] Thresholding can be classified into
  - 1] Hard Thresholding
  - 2] Soft Thresholding
- 4] In Thresholding pixels having intensity lower than the threshold  $T$  are set to zero and pixels having intensity greater than the threshold are set to 255 or left at their original intensity depending on the effect that is required.

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practical 3C

Apm - Grey level Slicing with background

Theory

- 1] The purpose of grey level slicing is to highlight a specific range of grey values.
- 2] The objective is to display high values for the range of interest & display the original grey level values in other values.
- 3] This approach preserves the background of the image.

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## Practical 3D

Aim - Grey level Slicing without background

### Theory

- 1] This displays the high values for a range of interest & low values in the other areas.
- 2] The main drawback of this approach is that the background information is discarded.



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## practical 4

Aim - Apply the following Image enhancement technique on a grey level image.

## practical 4A

Aim - Power law transformation.

### Theory

- 1] It is also known as Gamma Correction.
- 2] The power law transformation is given by  
$$g(m, n) = c * (f(m, n))^\gamma$$
- 3] Gamma values can either take integer value or fraction value.
- 4] When the value of gamma is less than one the image appears to be a dark image and when the value of gamma is greater than 1 the image appears to be bright image.



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practical 4B.

Aim - Log transformation.

Theory

- 1] The logarithmic transformation is given by  
$$g(m, n) = c \log_2 (F(m, n) + 1)$$
- 2] This type of mapping spreads out the lower grey levels.
- 3] For an 8 bit image the lower grey level is zero and higher level is 255.
- 4] It is desirable to map 0 to 0 and 255 to 255.

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## practical 5

Aim - Write a program to display a histogram of an image.

### Theory

- 1] Histogram manipulation basically modifies the histogram of an input image so as to improve the visual quality of an image.
- 2] The histogram of an image is a plot number of occurrences of grey levels in an image against the grey level values.
- 3] The histogram provides a convenient summary of the intensities in an image. It is unable to provide any information with respect to spatial relationship between pixels.
- 4] The histogram of a dark image will be clustered towards the lower grey level.
- 5] The histogram of a bright image will be clustered towards the higher grey level.
- 6] For a low contrast image the histogram will spread equally i.e. it will be narrow.
- 7] For a high contrast image the histogram will have an equal spread in the grey level.