EE-608:DIGITAL IMAGE PROCESSING

Lab Assignment 1

AIM:

1) To acquire an image, store in different formats and display the properties of the images.
2) To find the discrete Fourier transform of a gray scale image and perform inverse transform to get back the image

Background:

The functions used in this program are
subplot divides the current figure into rectangular panes that are numbered rowwise. Each pane contains an axes object which you can manipulate using Axes Properties. Subsequent plots are output to the current pane. h = subplot(m,n,p) or subplot(mnp) breaks the figure window into an m-by-n matrix of small axes, selects the pth axes object for the current plot, and returns the axes handle. The axes are counted along the top row of the figure window, then the second row, etc.

imshow – The function imshow(filename) displays the image stored in the graphics file filename. The file must contain an image that can be read by ***imread*** or dicomread. imshow calls imread or dicomread to read the image from the file, but does not store the image data in the MATLAB workspace. If the file contains multiple images, imshow displays the first image in the file. The file must be in the current directory or on the MATLAB path.
impixelinfo – The function impixelinfo creates a Pixel Information tool in the current figure. The Pixel Information tool displays information about the pixel in an image that the pointer is positioned over. The tool can display pixel information for all the images in a figure.
imageinfo – The function imageinfo creates an Image Information tool associated with the image in the current figure. The tool displays information about the basic attributes of the target image in a separate figure.
title – The function title('string') outputs the string at the top and in the center of the current axes.

Fourier Transform:

The fourier transform, developed by Jean Baptiste Joesph Fourier, is widely used in the field of image processing. An image is a spatially varying function. One way to analyse spatial variations is to decompose an image into a set of orthogonal functions, one such being the fourier functions. A fourier transform is used to transform an intensity image into the domain of spatial frequency.
The program first creates an image, finds its fourier transform and displays it. The inverse fourier transform is found to obtain and display the input image.
The rotation property of Fourier transform states that if an image is rotated by a certain angle, its fourier transform is also rotated by the same angle. The program rotates the input image by an angle of 45 degrees. The fourier transform of the rotated image is found and displayed.
The convolution property of the Fourier transform states that the convolution of two images in time domain is equivalent to multiplication of the fourier transforms of the individual images. Two images are created. The convolution of the two images is carried out and displayed. The fourier transforms of the individual images are found, multiplied and inverse fourier transform is applied to the product. We can observe that the output image is the same as obtained through convolution.

Deliverables:

1) Write a python or matlab code to implement above given tasks.
2) Anlayze the tasks clearly and mathematics behind the task.
3) Plot the results and make a report of results and observations.