

CUA-EECS Department
Project-2
ENGR 652- Advanced Optical and Image Processing
Due-Nov-5-2014

You have the option to create a new GUI or add to the midterm GUI the following functionalities:

(a) GUI should be able to perform convolution between two input images and display the result.

Example: two squares, two circles,....

(b) GUI should be able to draw the spectrum (amplitude and phase) of a given pattern or image. You can use the functions I uploaded on blackboard like `imspec` function or `imspecxy`. You can also use contrast enhancement techniques you have done for the midterm to enhance how the spectrum looks like (often the spectrum needs enhancement). Note that `imspec` has its own enhancement.

Typical examples of images are:

- Sinusoids (text boxes should hold the value of frequencies u_0 and v_0 of the sinusoid)
- Single circle or rectangle (text box should hold the value of radius, or height and width,)
- Multiple circles or rectangles (your program should have multiple text boxes to enter the periods in x and y of the typical structures)
- Single or multiple stripes,
- GUI should have the ability to load a general image and do the FFT of it.

(c) Your GUI should be able to perform filtering using two techniques:

1. Starting from impulse response technique: (either use similar to my code or the `fspecial` function in matlab)

- 'average' averaging filter
- 'disk' circular averaging filter
- 'gaussian' Gaussian lowpass filter
- 'laplacian' filter approximating the 2-D Laplacian operator
- 'log' Laplacian of Gaussian filter
- 'motion' motion filter
- 'prewitt' Prewitt horizontal edge-emphasizing filter
- 'sobel' Sobel horizontal edge-emphasizing filter
- 'unsharp' unsharp contrast enhancement filter

In all these filters you have to submit the appropriate parameters using text boxes or sliders.

2. Start from frequency response

- low pass (ideal, butterworth, Gaussian)
- highpass (ideal, butterworth, Gaussian)
- bandpass (ideal, butterworth, Gaussian)
- bandreject (ideal, butterworth, Gaussian)

- notch reject filters You can use the mouse to select the region as I showed in class for the notch filter).

So you can create for example a popup menu for each filtering technique to select the filter type you want and text boxes indicating the parameters of that typical filter you are using.

You should be able to show the original as well as the filtered image.

Submit the code of the GUI and the associated figure and the associated functions in one zip file via email.

Since there are six of you and the project is time consuming I suggest two teams of three and partition the work equally among your selves.