Digital Image Processing – Spring 2017

Assignment No. 3- Spatial and Frequency Filtering

Due date: June 4, 2017

Keyword: Filtering, Fourier Transform, Convolution.

Programming Language: C++/Python with OpenCV

In this assignment you are required to provide functions that applies filtering the spatial and frequency domain on a given **gray scale** image. You are not allowed to use the convolution or filtering from the opencv library. Toward this task you are required to implement the following functions:

void FFT(Mat img, Mat fq);

This function implements the Fast Fourier Transform

void IFFT(Mat img, Mat fq);

This function implements the Fast Inverse Fourier Transform

void Convolve(Mat img, Mat filter, Mat result);

This function computes the convolution of the Matrix img with the Matrix filter.

void ImagePadding(Mat img, Mat filter, Mat padded_img);

This function computes the appropriate padding for the image img, and the filter filter. It returns the padded image in the matric padded_img

Submission:

You are required to submit a standalone application that uses these function. It accepts and image, high/low pass filter, D0, and filter type (Ideal, Gaussian, or Butterworth). It generate a filter in the frequency domain and its corresponding filter in the spatial domain and applies both to the input image, each one on its appropriate domain. It then show the original image, filter, two filter images and their difference.