Computer Projects # 2

[1] Fourier Spectrum and Average Value

(a) Use in Matlab "help fft" and "help fft2" to learn the commands for computing discrete Fourier transforms. Sample codes using the Fourier transform in 1D and 2D are posted on the course webpage.

(b) Download Fig5.26a and compute its (centered) Fourier spectrum.

(c) Display the spectrum.

(d) Using your algorithm, obtain the average value of the input image.

[2] (a) Implement the Gaussian lowpass filter using a radius $D_0 = 25$, and apply the algorithm to Fig4.11(a).

(b) Highpass the input image used in (a), using a highpass Gaussian filter of radius $D_0 = 25$.

[3] Linear Spatial filtering Consider the noisy X-ray image of circuit board corrupted by salt-and-pepper noise. Filter this image by applying a linear average filter with a 3×3 mask (use the average mask with entries $w_{s,t} = \frac{1}{9}$, for all $s, t \in \{-1, 0, 1\}$).

[4] Write a computer program that will denoise an image using the 3x3 median filter. Apply your algorithm to the X-Ray image of circuit board corrupted by salt-and-pepper noise (Fig3.37(a).jpg). Compare your result with the one obtained in the previous case, by the linear average filter.