Exercise 1 – deadline: 14/1/1401

Sampling and quantization:

1- Load and display image1 and answer the below question:

a) Computes the difference between values in neighboring pixels and Find the number of bytes and size of the image, and display each case.
b) Representation the image with unit-8 data type, default type (float 64) and by adding bias (128) and plot it.
c) How many bits can manage so that we still have a good image? Plot all of the cases.

Geometrical spatial operations:

2- Perform the scaling (1.5*1.5), translation and rotation (90°) operations for image2 and plot the final image in each case.

Filtering in Spatial Domain:

3- Apply each spatial filters to the image according to the below table and compare the original image and the image after using the filter.

section	Filter name	Size of Filter	Image
a	Average(Mean) filter	5 * 5	image1
b	Median filter	5 * 5	Image2
c	Laplacian filter	5 * 5	Image3
d	Sobel(X and Y) filter	7 * 7	Image4

Filtering in Frequency Domain:

4- Apply frequency filters in each case and compare the original image and the image after using the filter:
   (a) Apply frequency spectrum with Fast Fourier Transformation (FFT), centered spectrum, decentralized spectrum and inverse FFT on image5 and show them.
   (b) Apply Ideal Low Pass Filter (ILPF) and Ideal High Pass Filter (IHPF) on image5 and show them.
   (c) Apply Gaussian Smoothing with 3, 5, 7 and 9 kernel size on image6 and show them.

5- Remove the noise of images 1-2-3-4 with proper filters.
6- Improve the details and visibility of images 5 to 10 with whatever you know from spatial to frequency domain operations.

7- Make image 11 and 12 younger with frequency domain operators.

Write a report with description of steps in each number and each case and also put the screenshot of the original images and results in the report.

Attach the code.

Make HW1.zip

Upload it in elearn system.