

## Homework #3 – Image Restoration

Assigned: 12.05.2017 Due: 26.05.2017

### 1. Objective

In this homework, you will experience with spatial and frequency domain filters in order to restore images with different noise types.

### 2. Specification

#### Task 1 – Image Restoration in the Spatial Domain

Write a Matlab script that generates 2 figures as in Figure 1.

- In the first figure, you should add *Gaussian noise* to the input image, and then apply averaging and median filters with different kernel sizes.
- In the second figure, add *Salt&Pepper noise* to the input image with spatial density 0.2, and apply the same filters for generating the first figure.
- You can use the Matlab Image Processing Toolbox (IPT) functions such as *imnoise()*, *filter2()*, *fspecial()*, and *medfilt2()*.

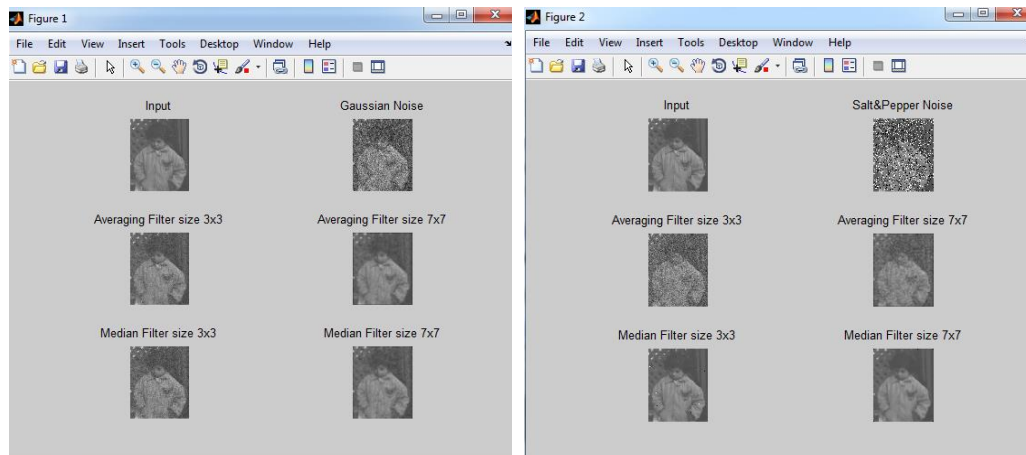


Figure 1: Sample output of the first program.

#### Task 2 – Image Restoration in the Frequency Domain

Download the starting codes [here](#). Your job is to complete the **HW3\_Task2.m** script. You are initially given the code that reads an image file and adds it a periodic noise. You should add your code that removes the periodic noise from this image by using a *bandreject* filter. You are already given the implementation of *bandreject* filter. Inspect *test\_lpfilter.m* and *test\_notch.m* files to learn the application of these filters. You may also need to look at [here](#). You are supposed to adjust the parameters of the filter according to the input image and remove the noise to some extent. The output of your program should include the images in Figure 2. These are: image with periodic noise, Fourier spectrum of the

noisy image, Fourier spectrum after multiplication with the filter, and inverse Fourier transform (filtered image).

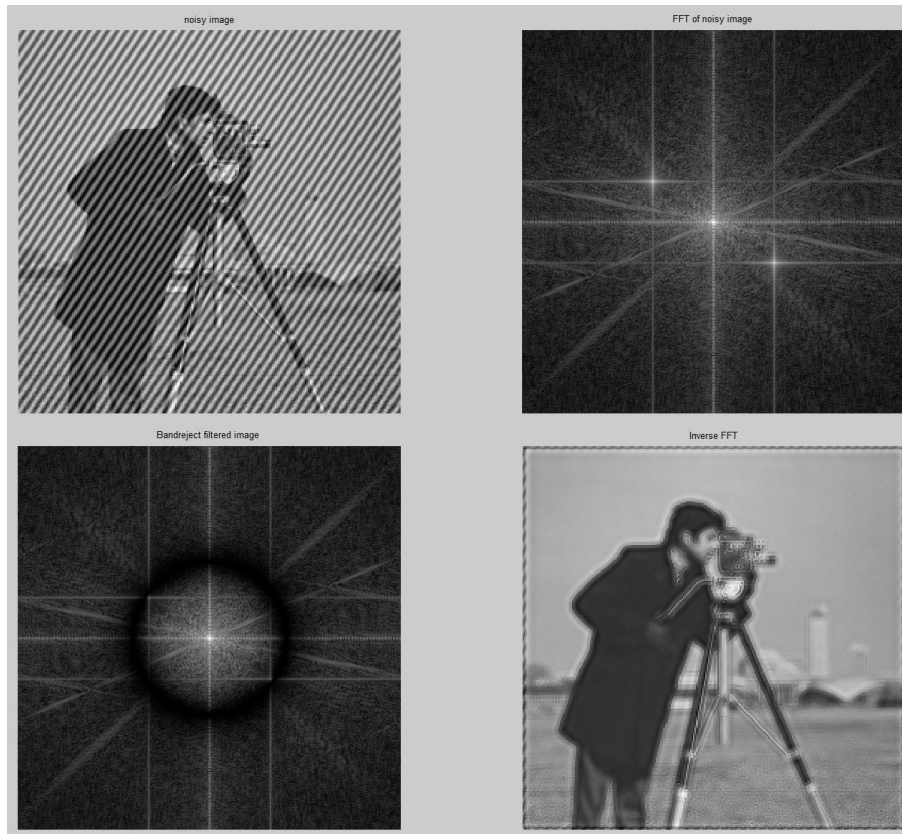


Figure 2: Sample output of the second program.

Note that the output in Figure 2 is just an example. You can play with the filter parameters according to the input image and obtain better results. You can also use notch filters or custom filters you designed for better noise removal (**but you are not supposed to do this for this HW**).

### 3. Submission

- This homework can be done individually or in pairs.
- You should submit all your **Matlab source codes**. Place all your files in a zip archive with name **HW3\_Surname1\_Name1\_Surname2\_Name2.zip** and submit through the Moodle submission module.
- If you have further questions, you can send me an e-mail or come to my office.

### 4. Late Submission Policy

Deadline for homework submissions is **23:59 pm** at the specified date. For each additional day, **25% cut-off** will be applied.

Assist. Prof. Dr.  
Zeynep ÇİPİLOĞLU YILDIZ