



InClass Exercise 4

Due by 2/13/2018, Tuesday Midnight through Canvas

Requirements: Please ensure that all source code is tested properly and follows general code readability guidelines (i.e., includes proper variable names, adequate comments as well as brief description of your logic or pseudocode or algorithm used). Submit all files including any images.

Part 1: Median Filtering

Write a MATLAB function to perform filtering operation using a median filter. Please submit median_filtering.m file which contains the following:

- function [output_image] = median_filtering(input_image, kernel_size, weights_matrix)
where:
 - input_image: This argument should accept a gray scale image of any dimensions.
 - kernel_size: specify the size of median filter given as 1x2 size matrix (e.g., 3x3 kernel will be [3 3]).
 - {optional} weights_matrix: This argument is optional. If user doesn't provide one, you should use median filtering. If user provides it, use that for weighted median filtering with given weights matrix. The size of weights_matrix must match the kernel size.
 - output_image: The function should return filtered image.

Part 2: Comparing Noiseless and Noisy Results

Use median_filtering.m (from above) for median and weighted median filtering.

- a) Take an image and apply median, weighted median and Gaussian filtering on the image. Try 3 different kernel sizes.
- b) Now add noise to your input image and then use filtering methods to denoise. Submit output for input image with a) random noise, b) salt & pepper noise when denoised with median, weighted median and Gaussian filtering of three different kernel sizes (e.g., (3x3, 5x5, 11x11).
Please write a short description [1 page max] to explain your observations (i.e., the differences in denoising results with respect to different kernel types and sizes)

Note – You can use the following in-built functions of MATLAB: imfilter, fspecial, imnoise. You can use boundary condition of your choice

Helpful link: <https://www.mathworks.com/help/images/noise-removal.html>