SCHOOL OF INFORMATICS,
COMPUTING, AND ENGINEERING
INDIANA UNIVERSITY

InClass Exercise 3
Due by 2/6/2018, 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: Image Filtering
Write a MATLAB function to perform filtering operation using a given filter (kernel). Please submit myfilter.m file which contains the following:

- function [output_image] = image_filtering(input_image, kernel_input, boundary_choice) where:
    - input_image: This argument should accept a gray scale image of any dimensions.
    - kernel_input: This argument should accept kernel of any size.
    - booundary_choice: This argument should accept one of these 4 values:
        - 0 – zero padding
        - 1 – wrap around
        - 2 – copy edge
        - 3 – reflect across edge
    - output_image: The function should return filtered image.

Note: MATLAB has its own functions for image filtering (i.e., imfilter) but we are expecting you to implement your own version.

Part 2: Comparing different filters
a) Write MATLAB program to filter a chosen image (using your own function from above) with a box filters of size 3x3, 5x5 and 11x11. Repeat the process for Gaussian kernels of same sizes. Select any boundary choice. Display the results in a figure in 2x3 grid of subplots where one row shows filtered images with three different kernel sizes and second row shows the same with different kernel. Be sure that each plot is properly labelled and titled for identification. *Please write a short description [5-6 lines max] to explain your observations (i.e., the differences in the filtered images with respect to different kernel types and sizes)*

b) Write MATLAB program to filter a chosen image (using your own function from above) with Prewitt, Sobel, and Robert filters for any boundary choice. Remember that these have filters have horizontal and vertical derivatives. Display the results in a figure in 2x3 grid of subplots where one row shows filtered images with three different kernels in horizontal direction. Second rows shows the filtered images in vertical direction. Be sure that each plot is properly labelled and titled for identification. *Please write a short description [5-6 lines max] to explain your observations (i.e., the differences in the filtered images with respect to different kernel types)*

c) Write MATLAB program to filter a chosen image (using your own function from above) with Laplacian, Box (3x3) and Gaussian (3x3) filters for any boundary choice. Display the results in a figure in 4x3 grid of subplots where each row shows filtered images with three kernels using one boundary choice. Second row will show the same results with different boundary choice, and so on. Be sure that each plot is properly labelled and titled for identification. *Please write a short description [5-6 lines max] to explain your observations (i.e., the differences in the filtered images with respect to different kernel types)*