ELEN 640, COEN 340: Image Processing I
Fall 2020
Homework 4

Due Date/Time: Wed Nov 11, 2020. 7:00 PM Pacific

Notes:

1. Same comments apply to this homework that were enumerated in Homework 1.
2. **Do not use any built-in convolution or kernel filtering functionality. You can zero-pad the input images around the edges for this homework.**
3. Use "coins.tif", "Apple.tif" and "Gearwheel.tif" for this exercise. Convert them to 8-bit grayscale image.

Problems:

1. This problem demonstrates one of the uses of morphological filtering.
    a. Apply $Sobel_x$ and $Sobel_y$ kernels to the images and get the edge magnitude ($(sx_{i2} + sy_{i2})_{1/2}$) for the images.
    b. Normalize the edge image to [0, 1]. Apply various thresholds between [0, 1] to get binarized edge image. Thresholds = 0.2, 0.5, 0.7, 0.9.
    c. Scale these images to [0, 255] and display the results.
2. Use a 3x3 template for each of the binarized image
    a. Dilate the edge images. Display the results.
    b. Erode the edge images. Display the results.
    c. Dilate once and apply erosion to the dilated image. This is Closing operation. Display the final result.
    d. Erode once and apply dilation to the eroded image. This is Opening operation. Display the final result.
    e. Dilate twice and erode twice on the dilated image. Display the final results.
    f. Erode twice and dilate twice on the eroded image. Display the final results.