MV Assignment 2

Problem 1.

Noise Reduction:

i. Read the image "bridge.gif". Filter the images using the masks of of 3x3, 5x5 and 7x7. How does the size of the mask affect blurring and noise reduction? Which do you think provides a better tradeoff between blurring and noise reduction for this image?

ii. Sharpen the 3x3 blurred image by convolving with the Laplacian mask
0 -1 0
-1 5 -1
0 -1 0
Display and submit. Does this operation reduce the blurring? What about the original noise? You might need to rescale this image after convolving to make the effect more visible and to make the contrast more pleasing.

iii. Apply a second sharpening step as in (ii). Display and submit. Would repeated sharpening help image interpretation? Again, rescaling will be needed to see the effect.

Problem 2.

In this problem you will develop and test a 2-D median filtering algorithm.
(a) Develop a 2-D median filtering algorithm. Do not use the inbuilt 1D/2D median filter functions from python or Matlab. Draw a block diagram explaining the filtering
algorithm.

b) Use your median filter for filtering the image "Q2.tif" in the following cases :
• Median filtering performed with a 3 →↹3 mask

• Median filtering performed with a 7 →↹7 mask

• Median filtering performed with a 15 →↹ 15 mask

Problem 3.

For the image "cameraman.gif",
a) Compute and display the gradient images using
i) Robert cross-gradient operators

ii) Sobel operators
Are the two images the same?
Compute and display the absolute difference between the two images obtained in (a). What
can you tell? Explain your observation(s).

b) a) Compute and display the gradient images using
i) Prewitt operators
ii) Sobel operators
Compute and display the absolute difference between the two images obtained in (b). What
can you tell? Explain your observation(s).

Problem 4.

Use an image of your choice to demonstrate the effect of repeatedly applying a 3x3 low-pass spatial filter to a digital image.

Repeat previous operation for a 3*3 median filter. What is the effect (for this opeartion add salt and pepper noise with pb=0.2 to the image pepper.jpg.)?