

1. Implement the median filter for your image. First randomly pick 400 pixels and set their values to zero to obtain a pepper noise corrupted image. Then apply the median filter with  $W = 3$ .
2. Detect horizontal and vertical edges in your image using the simple, Prewitt and Sobel operators. Show horizontal edge maps, vertical edge maps and combined edge maps. Comment on differences between horizontal and vertical edge maps. Experiment with the relevant thresholds and try to choose them as best as you can.
3. Write a MATLAB code for image sharpening using the Laplacian filter.
4. **(a)** Generate a  $512 \times 512$  image which contains a  $32 \times 32$  square placed at the center of the image. Set the background to black (i.e., 0) and the interior of the square (and its boundary) to white (i.e. 255). Take the DFT of the image and show its magnitude without shifting it to the center of the frequency domain. Then, shift the magnitude to the center of the frequency domain and show the centered magnitude.  
**(b)** Generate a  $512 \times 512$  image which contains a  $64 \times 64$  square placed at the center of the image. Repeat the steps given in 4(a). How do your results compare with 4.(a)?  
**(c)** Generate a  $512 \times 512$  image which contains a  $128 \times 128$  square placed at the center of the image. Repeat the steps given in (4.a). How do your results compare with (4.a) and (4.b)?
5. Using the image shown below (icextl.tif), use sharpening to enhance the pictures. What can you do about the uneven illumination? Can you improve the picture? Write a Matlab code to do this

