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Computer Vision: Programming Assignment 1

Question 1:
Input image



Results:

denoised image with standard deviation 20 of size 3x3



denoised image with standard deviation 5 of size 3x3



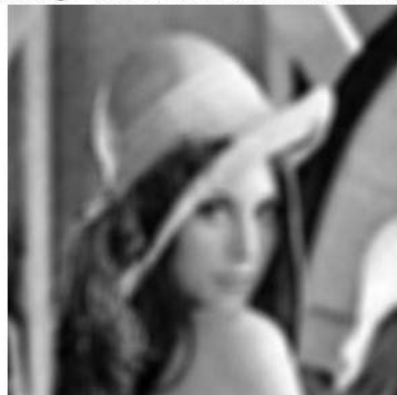
denoised image with standard deviation 5 of size 7x7



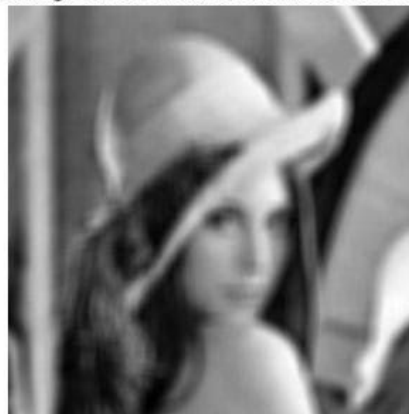
denoised image with standard deviation 20 of size 7x7



denoised image with standard deviation 5 of size 11x11



denoised image with standard deviation 20 of size 11x11



denoised image with mean filter of size 3x3



denoised image with mean filter of size 7x7



Inferences: We can see from the results that as we decrease the variance of the kernel the image becomes more smoothed and on increasing the kernel size of the image the image becomes more blurred and less noisy. And with the mean filter we can see that as the size of the mean filter increases the image becomes blurred with the noise. The best results can be seen with the standard deviation 5 and kernel 3x3 and mean filtered image of size 3x3.

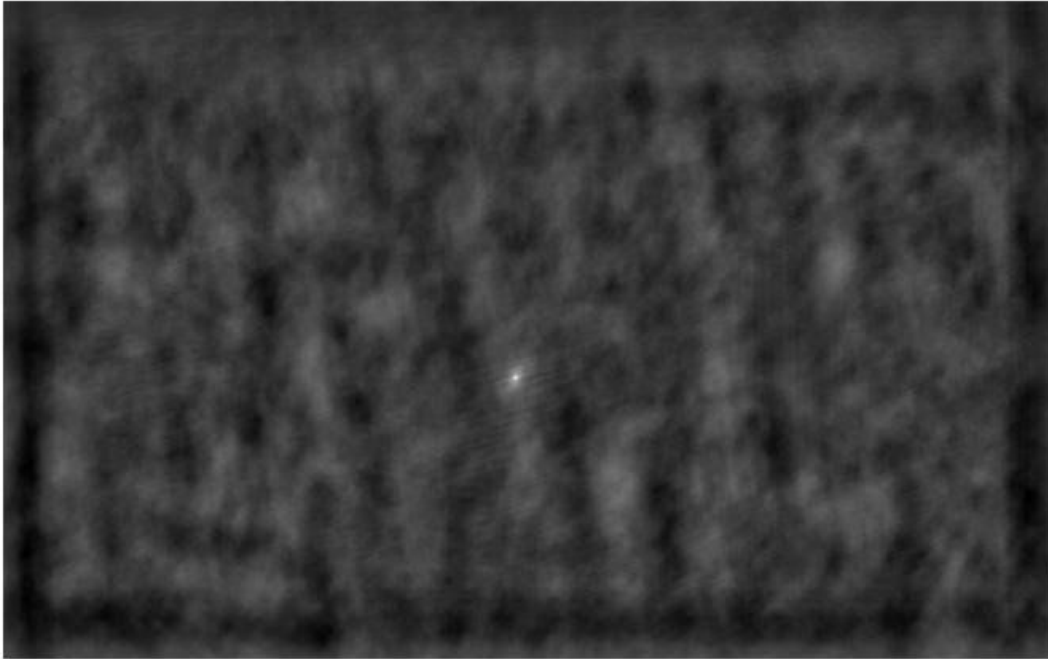
Question 2:

Input image and template(waldo).



Results: Cross Correlation map of the template and the image is as follows:

correlation map showing a dot where the correlation is maximum



And the detected waldo in the given input image can be seen in below figure:

the position of the image patch with the highest correlation



Inferences: We can see that due to the large similarity of the image and the template at the waldo's position we can see the bright spot in the correlation map, as crosscorrelation is the similarity index and gives high value if two matrix or vector are the same.

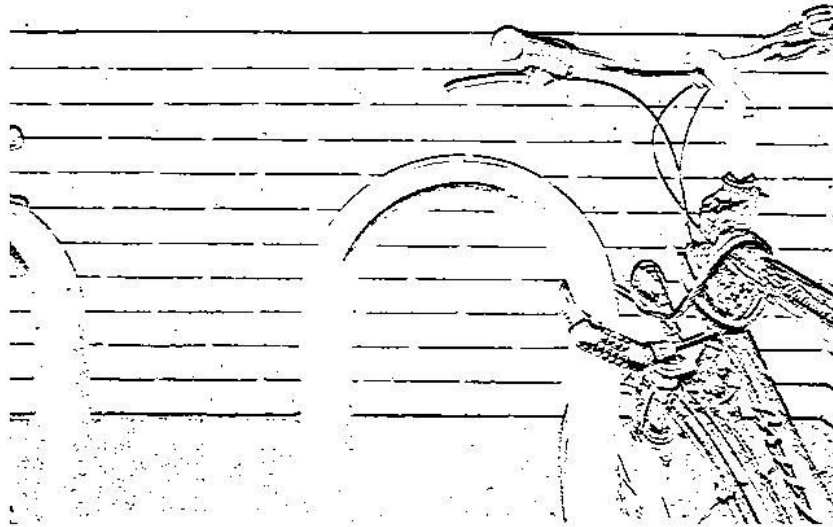
Question 3:
Input Image:

original image

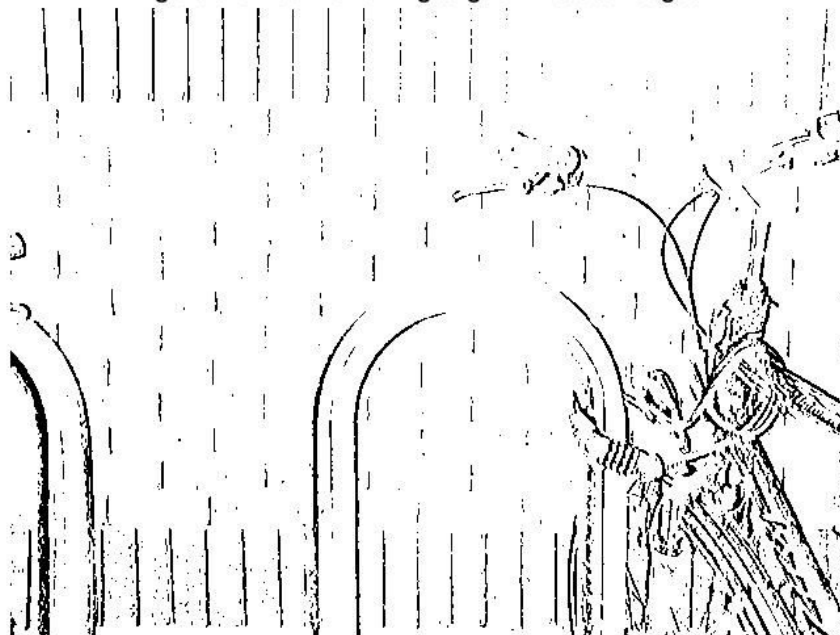


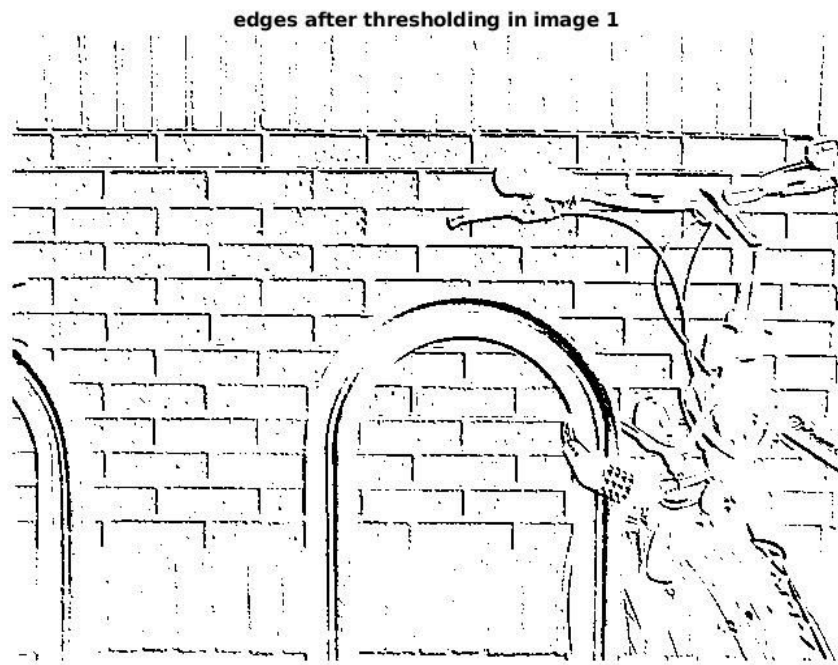
Results:

gradient matrix showing edges in horizontal edges



gradient matrix showing edges in vertical edges





Inferences: We can see that G_x gradient in x direction gives the vertical edges and the G_y gradient in y direction gives the horizontal edges and the Gradient magnitude i.e $|G_x| + |G_y|$ combining gives the both vertical and horizontal edges.