Assign 5

Q1.

a. For the given color image of pepper, convert it to HSI. You are free to use libraries for this. [1]
b. On the I channel perform the following steps of Canny edge

i. Use Sobel operator to compute X-gradient and Y-gradients. Show the magnitude and direction. Use convolution operator to find the gradient. Display the magnitude. Note magnitude can be more than 255, so you should normalize it to display. You can use libraries for convolution. You would see that edges are not clear and many flat regions too would show some response. [2]

ii. For each pixel, compute non-max suppression. You can skip border pixels. Note that you need to check the direction of gradient and accordingly use one of the four directions. Display the output image. Edges may be slightly more clear compared to (i). [3]

Q2.

a. For lena, convert it to Lab. You are free to use libraries for this. [1]
b. Using L channel, find Otsu' threshold. First normalize the image to [0,1]. You can consider only two values for thresholding – {.25, .5}.
   - Find the probability of each class obtained after using the thresholds. [1]
   - Compute the conditional mean for each class. [1]
   - Compute the conditional variance for each class. [1]
   - Compute weighted within class variance and check whether it is small for .25 or .5. Use the threshold for which it is minimum and display the segmented image. You can map pixels to 1 which are greater than threshold and map others to 0. Display the image. [1]