Quiz for EE 4211

Student ID:

Question 1 (20 points)

Write a MATLAB/python program with the following instructions:

- Input a gray-scale image '1.jpg'.
- Image gradient is measured by the following convolution masks, Show the corresponding image.

(a)

-1	0	1
$-\sqrt{2}$	0	$\sqrt{2}$
-1	0	1

(b)

-1	-1	-1
0	0	0
1	1	1

- For both (a) and (b), define a threshold as the 20% of the maximum of the gradient magnitude. Then for each pixel, if the gradient magnitude is smaller than the threshold, change the gradient magnitude to zero. Show the corresponding image.
- For both (a) and (b), Utilize the Hough transform to detect the four lines and process edge linking.
- Compare these two figures (a) and (b), and illustrate the reasons (you can use comments to answer this question in the Matlab/python files or you can upload a separate file for this question).
- For both (a) and (b), Utilize subplot to plot 4 images, including the original image, the processed gradient magnitude, hough transform with the largest two points, detected four lines in the original images. Please provide sufficient comments on the codes.

Question 2 (30 marks)

(a) Write a MATLAB/python program with the following instructions:

- Input a gray-scale image '2.png'
- Separate this image into two parts: left, right.
- For the left part, we apply Basic Global Thresholding, and for the right part, apply OSTU thresholding
- Use subplot to plot two images, including the original image and the image after the processing
- Note: you need to provide sufficient comments on the codes.

(b) Write a MATLAB/python program with the following instructions:

- Input a gray-scale image '2.png'
- Separate this image into equal eight parts
- For each part, we apply OSTU thresholding
- Use subplot to plot two images, including the original image and the image after the processing
- Note: you need to provide sufficient comments on the codes.
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(c) Write a MATLAB/python program with the following instructions:

- Input a gray-scale image '2.png'
- Add pepper noise to the image
- Apply three different steps to remove noises, Gaussian low pass filtering, or one of the suitable mean filters, or one of the suitable Order-Statistics filters to remove noise.
- Use subplot to plot 5 images, including original image, noise image, image after Gaussian low pass filtering, image after the suitable mean filter, image after the suitable Order-Statistics filter
- Note: you need to provide sufficient comments on the codes.