



Practice of the second series
Computer vision basics course

Related teaching assistant: Hamed Faizabadi, Afshin Zanganeh and
Mohammad Mousavi

Delivery deadline: 1/21/1402

1. Implementation of Sobel (10)

A) Create a 10x10 matrix with random values between 0 and 255. Then implement and run the horizontal and vertical Sobel operator on it without using library functions. Finally, the **gradient** size and direction matrix form the

b) One of the challenges of the Sobel operator is its sensitivity to noise. To solve this problem, the image can first be softened with a Gaussian or averaging filter and then run the Sobel operator on it. Read the jpg.afshin image and create a first channelize the load with a 3x3 Gaussian filter and then perform the Sobel operator on it and the outputs

compare.

and explain its parameters. C) Performed the operation of the previous section using the Sobel function in OpenCV

2. Noise removal (20 main marks + 5 bonus marks)

A) First, read the jpg.saffron image and remove the image noise by FFT transformation. In removing the noise from all steps

Also explain the reason for your work. Output and draw and

It is possible that the production line has a series of apertures that alternately guide: as seen in the background image. Try to

delete and recognize them as noise

b) Run canny edge finder on the output of step a. You can use ready-made functions for edge finder. That's it.

The function parameters that are initialized should be explained with the reason.) is desirable in the output of this step only

saffron flowers remain

c) Take the gradient from the obtained image and calculate the direction of the obtained gradients using the 2arctan function

do.

d) Points: using the direction of the obtained gradients, present a solution to obtain the cutting point of the stem from the petal.

give



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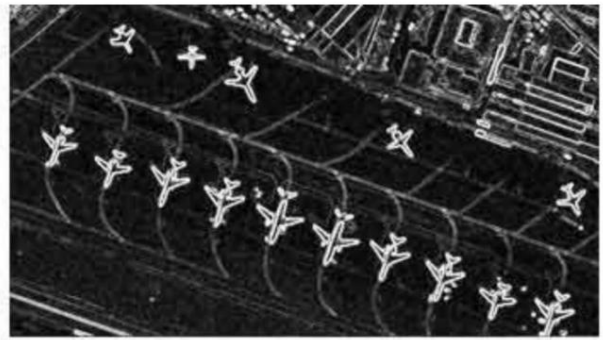
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3. Answer the following questions descriptively (20).

A) Explain low-pass (LPF) and high-pass (HPF) filters and tell where they are used for each.

Is? Why?

b) The image on the right is the result of applying any of the low-pass or high-pass filters on the left image



c) Compare the types of multiplicative and additive noise and provide solutions to eliminate them.

What filter do you suggest to use to remove it?


and what is pepper and d) noise of salt

4. Fourier transform (10)

A) What is the relationship between the origin point (0,0) of the Fourier transform of the image and the values of the image? Prove your answer with the existing relationships.

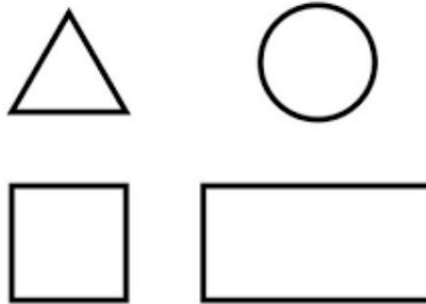
b) Obtain the Fourier transform of the image below by writing the relations.

4	0
3	2

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identify the triangle. (20 main points + 5 bonus points)

A) First, read the following image in the images folder.



b) Research the function findContours and tell what it does. Then use it to find and draw the contours of the shape. If preprocessing is also

Tell the reason for your work. *and* needed, do it.

identify the shape and specify this in the image with a c) Find and mark the corner points of the shape using the approxPolyDP function. Then

text. What class does it belong to? Explain the steps in the report by bringing images of

each step give

d) Points: If we wanted to use the feature engineering method to create a bundle for bug detection, what features do you think would be useful

and how many of them could you implement with your current knowledge?

6. In this question, we are going to learn about the types of filters for smoothing. Refer to notebook 6Q (20).

We are trying to get acquainted with three average filters, median and Gaussian. First, for padding, you must a) complete the 101reflect function

in this part, and for this you are not allowed to use loops (for, while, etc.).

Also analyze the effect of the kernel size on the output.) in all this section allowed to use libraries

You are not specialized in image processing.

b) In this part, we want to get acquainted with the Bilateral filter. First, search about it on the Internet and describe its formula, its parameters and

why it is used in your report. Also, about the effect of low and high values of two

Explain the standard deviation. (You are not allowed to use specialized image processing libraries in this section).



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and B with the OpenCV library and comparing it with C. In this part, the goal is to write all the filters in parts A.

It is our own implementation. (Hint: If your codes are correct, the outputs should be exactly the same)

Observe the requested items.

And Please read the document regarding the completion and delivery of lesson exercises

Be healthy and successful