Homework #2 \_ Report

CS-3150

Xiaosong Wang

After import all the package, I first read and plot my input image.

A person posing for a photo

Description automatically generated

Then I tried to use average filter to smoothing my image.

A close up of a sign

Description automatically generated

An old photo of a person

Description automatically generated

The image looks a little bit smoother and blur compare to the original one.

Then I tried using another average kernel.

A screen shot of a computer

Description automatically generated

A person posing for a photo

Description automatically generated

It is more obvious that the image become smoother. (It’s hard to see in the report, but it’s easier to see when overlap two image and switch them quickly)

Then I do the Sobel filter and got two image which focus on vertical and horizontal direction.

A close up of a logo

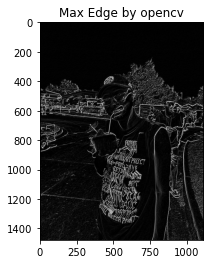
Description automatically generatedA screenshot of a cell phone

Description automatically generated

Vert\_by opence focuses on and plot the vertical edge of my original image and Horiz\_ by opencv focuses on and plot the horizontal edge of the image.

The opencv cannot generate good gradient edge picture (all black, because I don’t know what the opencv codes look like), so I tried the max edge which is provided in the demo code.

A close up of a logo

Description automatically generated

consolve2d can solve the problem and plot a better gradient edge picture.

A screen shot of a person

Description automatically generated

A close up of a logo

Description automatically generated

Then I tried Laplacian filter with two different Laplacian kernels.

A close up of a screen

Description automatically generated

A screen shot of a computer

Description automatically generated

A close up of a logo

Description automatically generatedA screenshot of a cell phone

Description automatically generated

Laplacian filter focusses more on the detail edge of the image. Compared with Sobel filter, Laplacian filter has more details.

Then I tried 3 by 3 median filter and Gaussian filter.

An old photo of a person

Description automatically generatedA person posing for a photo

Description automatically generated

I was expecting for a more drastic change on new images generated by median and gaussian filter, comparing with my original image. I even change the gaussian kernel, but it is hard to notice that image after gaussian filter is more blur or smoother than the origin.

A picture containing clock, dark, sitting, room

Description automatically generated

The filter I found which didn’t introduced in lecture is Maximum filter which to find the max number in the filter and replace the center one.

(

<https://www.geeksforgeeks.org/spatial-filtering-and-its-types/#:~:text=Spatial%20Filtering%20technique%20is%20used,mask%20traverses%20all%20image%20pixels>.

)

So I just sort the array and set the center value to the last value in the sorted array

A picture containing screen

Description automatically generated

A person posing for a photo

Description automatically generatedA person posing for a photo

Description automatically generated

Comparing with the original image, we can find out the new image is brighter (it is obvious if comparing the trees), because I’m selecting the larger number in the filter. The larger the number is, the brighter the image is.

This all for my homework 2. For 3\*3 average filter, median filter, and gaussian filter, I didn’t receive an obvious change.

I do try to import a close-up photo of one of my favorite actresses. The average filter, median filter, and gaussian filter works perfectly fine and I can see obvious changes. (Didn’t post the result because try to avoid any problem). I’m guessing it is because the actress’s photo I used, and the Lena picture has big character and simple background. It will be easier to detect the changes.