

Introduction to Computer Vision

Problem Set 1 Report

Computer Engineering

Mert Can Çakmak  
64160002

16 October 2019

I choose a 1000x1000 pixel colorful nice landscape for my input image.



Figure 1: Input Figure

I crop out a region from the center. The cropped image size is 500x500.



Figure 2: Cropped 500x500 Image from Center.

I exchanged the Red channel and Blue channel among them.In my picture redish areas became bluish areas.



Figure 3: Red and Blue Channels Exchanged.

I converted my input image to grayed image.



Figure 4: Grayed Figure.

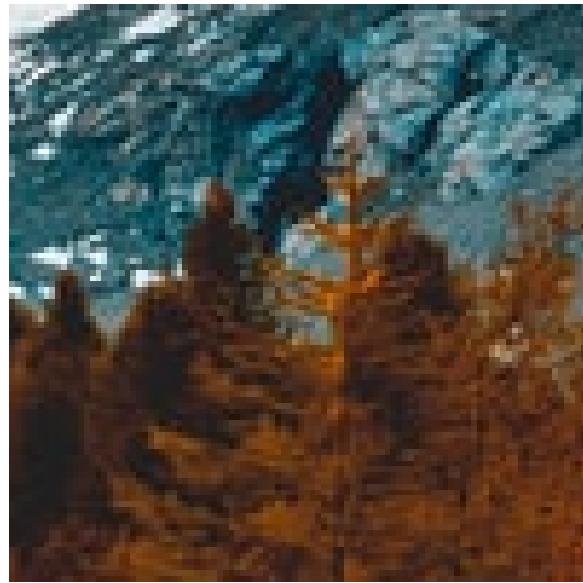


Figure 5: Cropped 100x100 Image from  
Center.



Figure 6: Grayed Cropped Image.

I replaced each BGR channel with grayed cropped one.



Figure 7: Replaced Center Area with  
Grayed One.

I used the function warpAffine() to transform the source image using the specified matrix. When we subtract shifted image from original one, we detect some edges. It is because if we have some high change between pixel values probably we have an edge there.

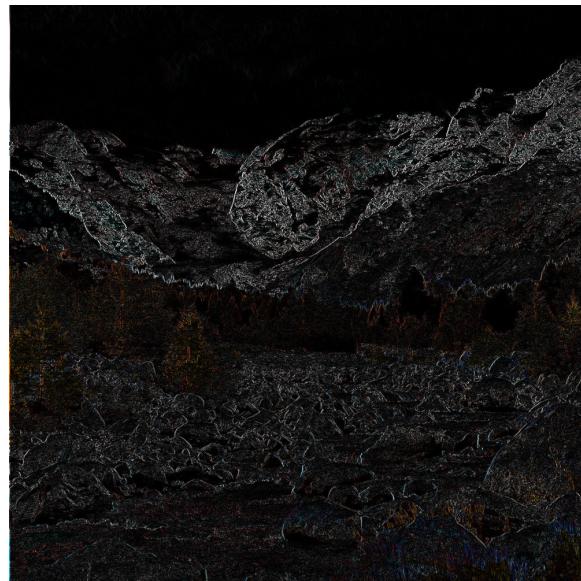


Figure 8: Differenced Image.

Edge Detection is simply a case of trying to find the regions in an image where we have a sharp change in intensity or a sharp change in color, a high value indicates a steep change and a low value indicates a shallow change.

Using Sobel Operator we are trying to find out the amount of the difference by placing the gradient matrix over each pixel of our image.

The gradient for x-direction has minus numbers on the left hand side and positive numbers on the right hand side and we are preserving a little bit of the center pixels.

The gradient for y-direction has minus numbers on the bottom and positive numbers on top and here we are preserving a little bit on the middle row pixels.

If the sums are non-zero, there is an edge there.

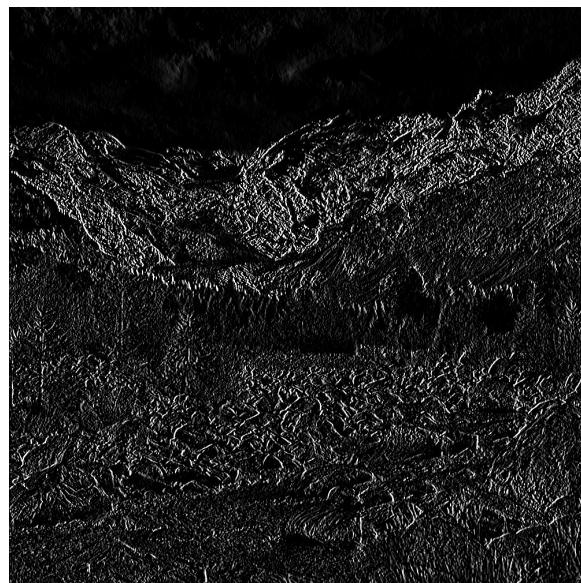


Figure 9: Axis X Sobel Image.

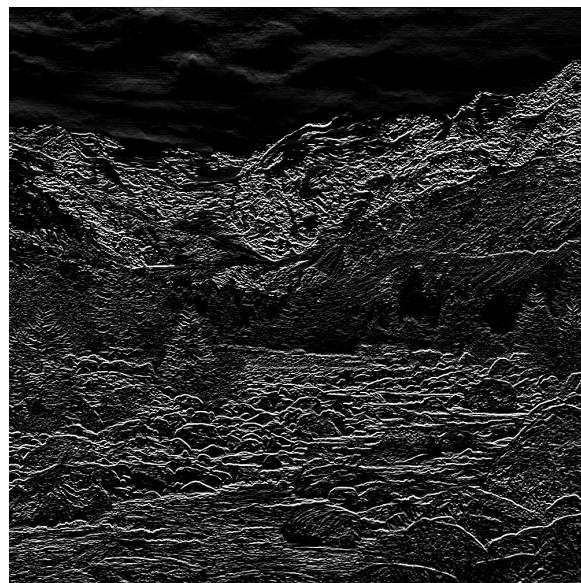


Figure 10: Axis Y Sobel Image.

To create gradient magnitude image we use this formula in shown below.  
Gradient magnitude image shows the edges very well.

$$\text{Gradient Magnitude} = \sqrt{Gx^2 + Gy^2}$$

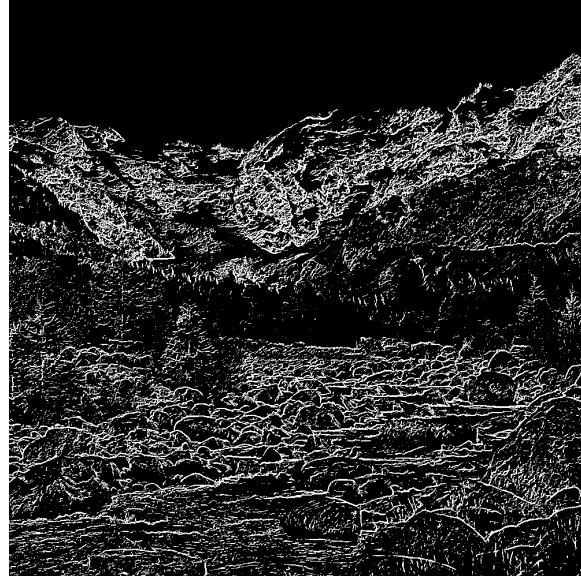


Figure 11: Gradient Magnitude.

I detect edges using Laplacian of Gaussian. First I blurred the image with Gaussian then I use Laplacian method.

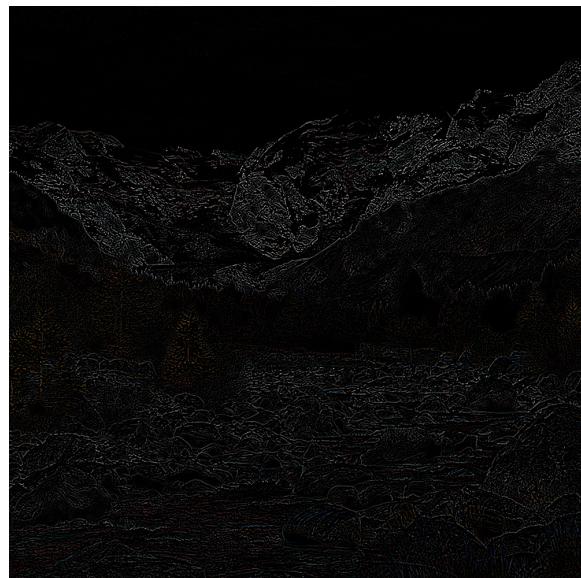


Figure 12: Laplacian of Gaussian Image.

I record a video. In the video I applied gray-scale image to the left and applied gradient magnitude to the right and also calculated frame per second to the up-left corner.



Figure 12: Webcam Capture.