



MIN-VIS-2016

ASSIGNMENT 3 – GROUP4



Group
Members:

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In this homework assignment you will be asked to implement the well-known Canny Edge detector. You can find the image(s) you need to process on SharePoint. In this assignment you are allowed to use predefined functions from the OpenCV library or other libraries for your assignment.

Canny Edge Detector.

- In class it was shown that Gaussian filters can be used for noise reduction (the first step). Implement a Canny Edge detector using “Church Canny Edge.png” of figure 1 and show your results when using Gaussian filters with kernel sizes of 3, 5 and 7. Comment your results.
- Gradients can be used to “color” certain pixels. Perform a Canny Edge detection on the image depicted in figure 1. and highlight every pixel with a gradient between 22.5 and 45.0 degrees, see also figure 2 as an example 22.5 – 67.5 , in green color in your output image. Compare your solutions when using the parameter **L2gradient** = true and **L2gradient** = false of the OpenCV function Canny. Show and comment your results.



Figure 1 Church Canny Edge

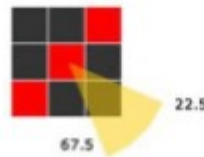


Figure 2

2. Solution

a.

Gaussian Filter :

In order to do edge detection, initially in this assignment we tried to smooth the image using Gaussian Blur with Different Kernel to reduce the noise in grayscale image .



Figure 1: Kernel 3



Figure 2: Kernel 5



Figure 3: Kernel 7

In the Above figures we applied three different kernels to check the Differences. As it seems that as we use higher kernel the Gaussian filter output gets more and more blurred and smooth for instance comparing the figure1 with figure3 which the figure3 looks more blurred.

Canny Edge Detection:

In order to detect the edges , in this assignment we used the built-in OpenCV canny edge detection .

This built-in function perform the some steps internally to detect the edges

- **Noise Reduction:** To remove the noise in the image with Gaussian filter.
- **Finding Intensity Gradient of the Image :**Smoothed image is then filtered with a Sobel kernel in both horizontal and vertical direction to get first derivative in horizontal direction and vertical direction.
- **Non-maximum Suppression:**, A full scan of image is done to remove any unwanted pixels which may not constitute the edge.
- **Hysteresis Thresholding :**This stage decides which are all edges are really edges and which are not.

Initially before applying canny edge we did apply the Gaussian blur and after that used the canny function using Different kernels.

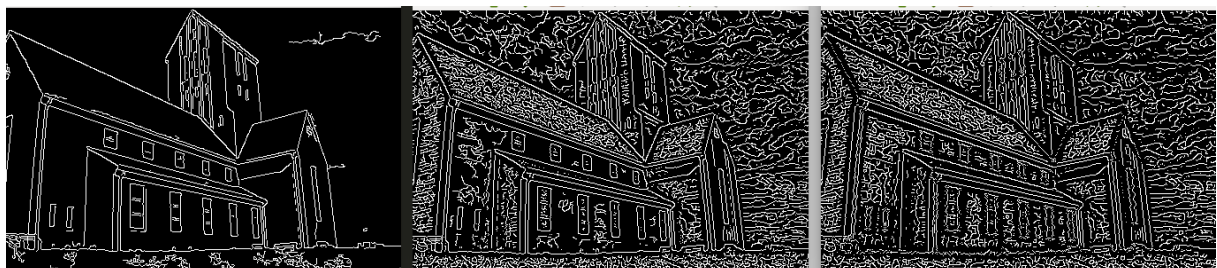


Figure 4: Kernel 3

Kernel 5

Kernel 7

So the result we got is, we use higher kernel the canny function ,will detects edges as more as possible .

b.

Use Gradient Filter to Colour Certain Pixels

In this part of assignment to colour certain pixels between given degrees.

At first we applied the canny edge detection and calculate its gradients then we went through each pixels and check its degree between the given the degree , assign a certain colour to that pixels.



In Summary, these are the steps applied:

- Load image in Grayscale
- Blur the image using Gaussian blur
- Apply Canny Edge on Blurred image
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