Shri Ramdeobaba College of Engineering and Management, Nagpur

Department of Electronics Engineering

Digital Image Processing (ENT 355-3)

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Experiment No: 09

Aim: Write a python code Canny edge detection

Theory: Canny Edge Detection is a popular edge detection algorithm. It was developed by John F. Canny in

1. It is a multi-stage algorithm and we will go through each stages.
2. **Noise Reduction**

   Since edge detection is susceptible to noise in the image, first step is to remove the noise in the image with a 5x5 Gaussian filter. We have already seen this in previous chapters.

3. **Finding Intensity Gradient of the Image**

   Smoothened image is then filtered with a Sobel kernel in both horizontal and vertical direction to get first derivative in horizontal direction (G_x) and vertical direction (G_y). From these two images, we can find edge gradient and direction for each pixel as follows:

   $$Edge\_Gradient(G)=G_{2x}+G_{2y}-------\sqrt{}Angle(\theta)=tan_{-1}(G_yG_x)$$

   Gradient direction is always perpendicular to edges. It is rounded to one of four angles representing vertical, horizontal and two diagonal directions.

Code:

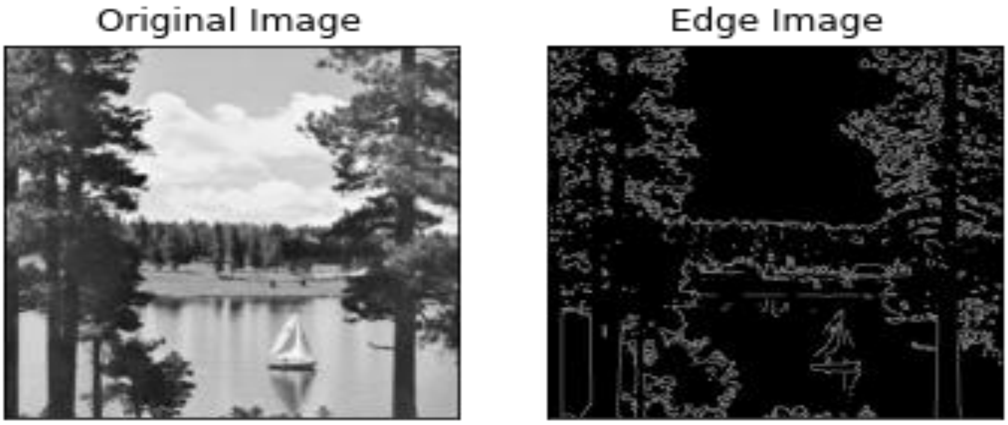
```
import numpy as np
import cv2 as cv
from matplotlib import pyplot as plt


img = cv.imread('lake.jpg',0)
edges = cv.Canny(img,200,250)

```

```
plt.subplot(121),
plt.imshow(img,cmap = 'gray')
plt.title('Original Image'),
plt.xticks([]), plt.yticks([])
plt.subplot(122),
plt.imshow(edges,cmap = 'gray')
plt.title('Edge Image'),
plt.xticks([]), plt.yticks([])
plt.show()
```

Output:



Conclusion: OpenCV puts all the above in single function, cv.Canny(). We will see how to use it. First argument is our input image. Second and third arguments are our minVal and maxVal respectively. Fourth argument is aperture_size. It is the size of Sobel kernel used for find image gradients