Name - Bolonghe B.P.M

Index No - 190095C

In [ ]:
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# Question 1

import numpy as np
import cv2 as cv
import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D
from matplotlib import cm
fig,ax = plt.subplots(1,2,figsize=(16,8))
ax1 = fig.add_subplot(121, projection='3d')
ax2 = fig.add_subplot(122, projection='3d')

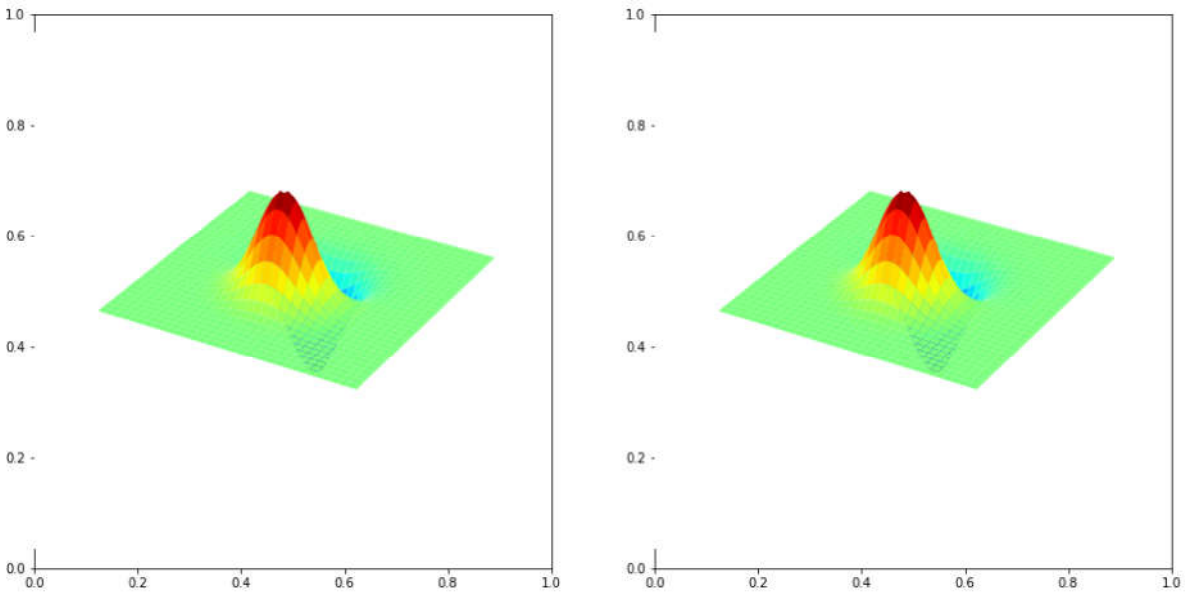

delta=0.1
xx,yy = np.meshgrid(np.arange(-5,5+delta,delta),np.arange(-5,5+delta,delta))

sigma = 1
g = np.exp(-(xx**2 + yy**2)/(2*sigma**2))
g/=np.sum(g)

sobel_v=np.array([[-1,-2,-1],[0,0,0],[1,2,1]], dtype=np.float32)
g_x = cv.filter2D(g,-1,sobel_v)

sobel_h=np.array([[-1,0,-1],[-2,0,2],[-1,0,1]], dtype=np.float32)
g_y = cv.filter2D(g,-1,sobel_v)

surf1= ax1.plot_surface(xx,yy,g_x,cmap=cm.jet,linewidth=0,antialiased=True)
surf2= ax2.plot_surface(xx,yy,g_x,cmap=cm.jet,linewidth=0,antialiased=True)
ax1.axis('off')
ax2.axis('off')
plt.show()
```



In [ ]:
```
### Question2
import numpy as np
import cv2 as cv
import matplotlib.pyplot as plt

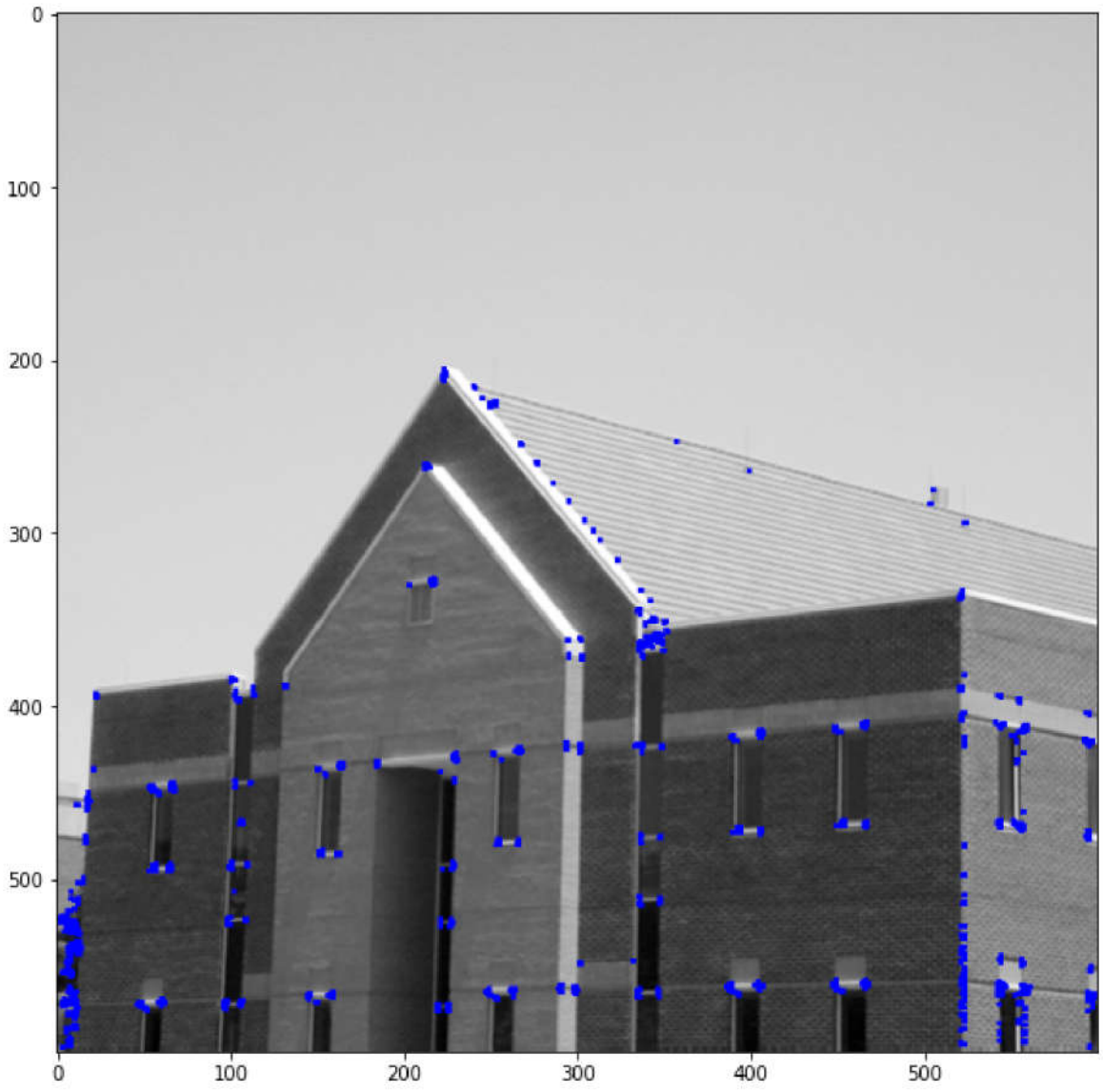
im = cv.imread(r'D:\PasinduManodara\Documents\OneDrive - University of Moratuwa\Aca
```

```
assert im is not None

gray=cv.cvtColor(im, cv.COLOR_BGR2GRAY)
gray =np.float32(gray)
dst = cv.cornerHarris(gray,2,3,0.04)

dst = cv.dilate(dst, None)
im[dst>0.01*dst.max()]=[0,0,255]

plt.figure(figsize=(10,10))
plt.imshow(im)
plt.show()
#cv.imshow('dst',im)
#cv.waitKey(0)
#cv.destroyAllWindows()
```



In [ ]:

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### Question 3

import numpy as np
import cv2 as cv
import matplotlib.pyplot as plt
from skimage.feature import peak_local_max

im = cv.imread(r'D:\PasinduManodara\Documents\OneDrive - University of Moratuwa\Aca
assert im is not None

I = cv.cvtColor(im,cv.COLOR_BGR2GRAY)
```

```
I = np.float32(I)
sobel_v=np.array([[-1,-2,-1],[0,0,0],[1,2,1]], dtype=np.float32)
g_x = cv.filter2D(g,-1,sobel_v)

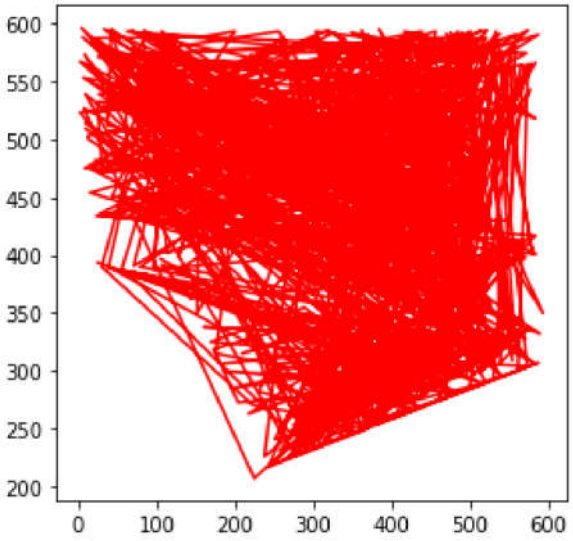
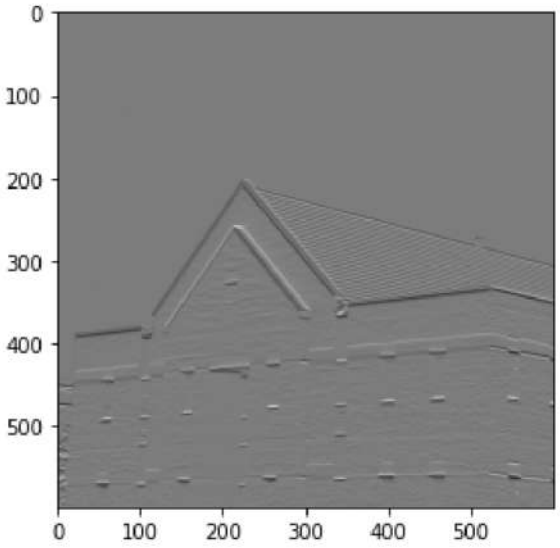
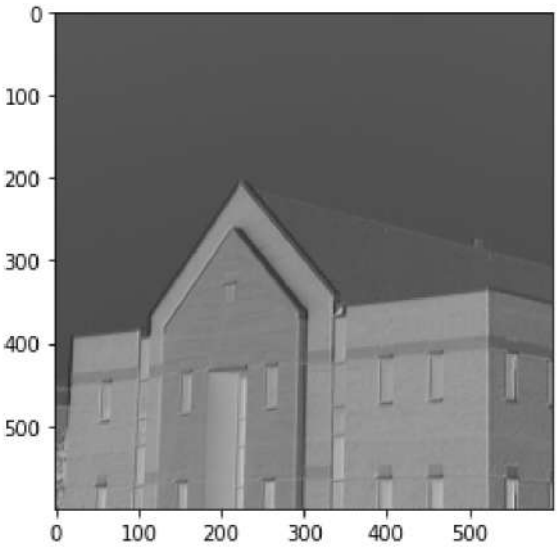
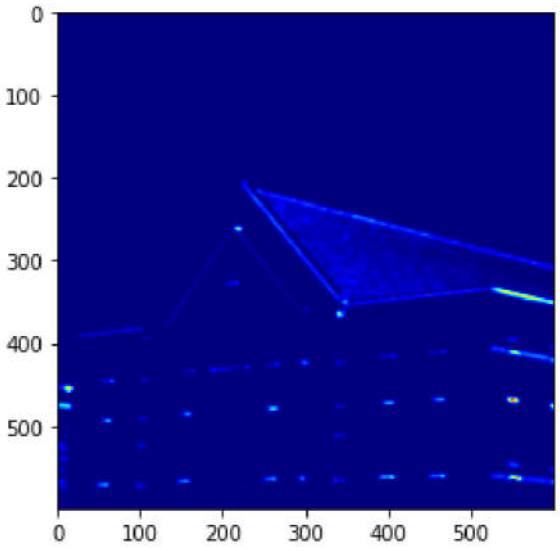
sobel_h=np.array([[-1,0,-1],[-2,0,2],[-1,0,1]], dtype=np.float32)
g_y = cv.filter2D(g,-1,sobel_v)

Ix= cv.filter2D(I,-1,sobel_v)
Iy= cv.filter2D(I,-1,sobel_h)

sigma =3
ksize =7
m11 = cv.GaussianBlur(Ix*Ix,(ksize, ksize),sigma)
m12= cv.GaussianBlur(Ix*Iy,(ksize, ksize),sigma)
m21 = m12
m22 = cv.GaussianBlur(Iy*Iy,(ksize, ksize),sigma)

det = m11*m22-m12*m21
trace = m11+m22
alpha = 0.04
R = det - alpha*trace**2
R[R<1e4]=0
coordinates = peak_local_max(R,min_distance=2)

fig,ax = plt.subplots(2,2,figsize=(10,10))
#ax[0,0].imshow(im, cmap='gray')
ax[0,0].plot(coordinates[:,1],coordinates[:,0],'r')
ax[0,1].imshow(Ix+127, cmap='gray')
ax[1,0].imshow(Iy+127, cmap='gray')
ax[1,1].imshow(R+127, cmap=cm.jet)
plt.show()
```

In [ ]:
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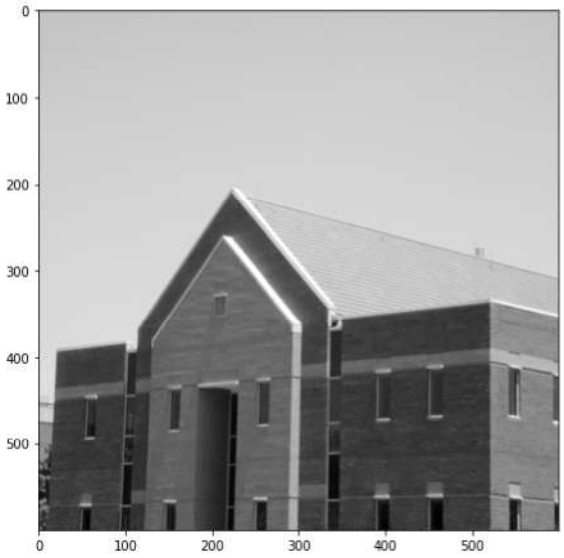
### Question 4
import numpy as np
import cv2 as cv
import matplotlib.pyplot as plt

im = cv.imread(r'D:\PasinduManodara\Documents\OneDrive - University of Moratuwa\Aca
assert im is not None
edges = cv.Canny(im,100,200)

fig,ax = plt.subplots(1,2,figsize=(16,20))
ax[0].imshow(im, cmap='gray')
ax[1].imshow(edges, cmap='gray')
plt.show()
```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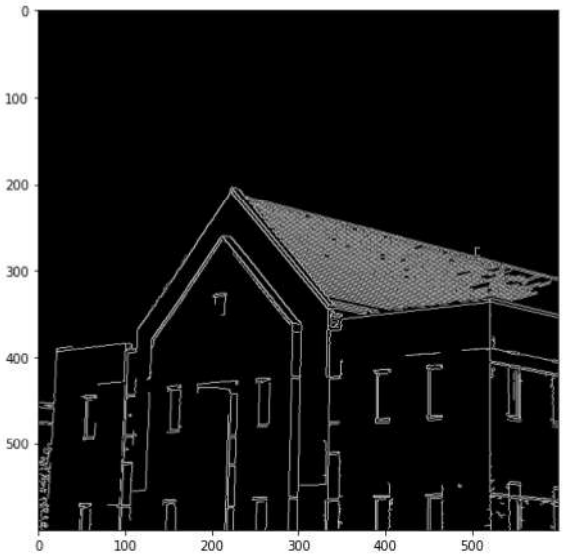
500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