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ROLL NO. C114

Batch : C2

```
import cv2
import numpy as np
import matplotlib.pyplot as plt
```

```
image = cv2.imread('/content/buildings.jfif')
```

```
image = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
```

```
img1 = image.copy()
```

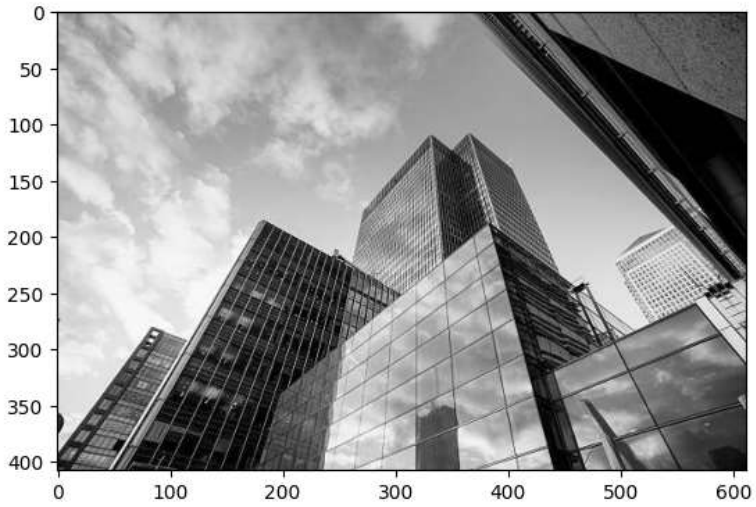
```
img1_g = cv2.cvtColor(img1, cv2.COLOR_RGB2GRAY)
```

```
img1_g
```

```
ndarray (408, 612) show data
```

```
plt.imshow(img1_g,cmap='gray')
```

```
<matplotlib.image.AxesImage at 0x7e7de0d90e50>
```



```
[rows,cols]=img1_g.shape


R=cv2.cornerHarris(img1_g,3,3,0.04)


th_neg=0.3*R.min()


for r in range(0,rows):
    for c in range(0,cols):
        if R[r,c]<th_neg:
            cv2.circle(img1,(c,r),5,(255,0,0),1)


plt.imshow(img1)
plt.title("Image with Edges")
```

```
Text(0.5, 1.0, 'Image with Edges')
```

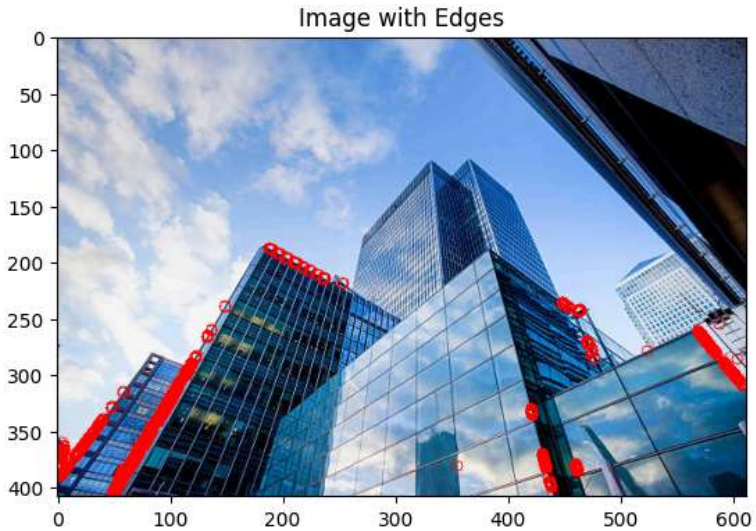


IMAGE WITH CORNERS (CORNER DETECTION)

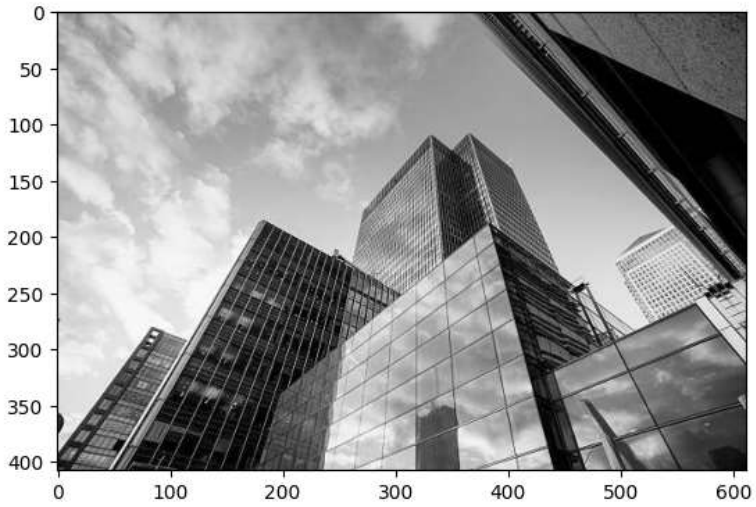
```
import cv2
import numpy as np
import matplotlib.pyplot as plt

image = cv2.imread('/content/buildings.jfif')

image = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
```

```
img1 = image.copy()
img1_g = cv2.cvtColor(img1, cv2.COLOR_RGB2GRAY)
img1_g
```

ndarray (408, 612) show data

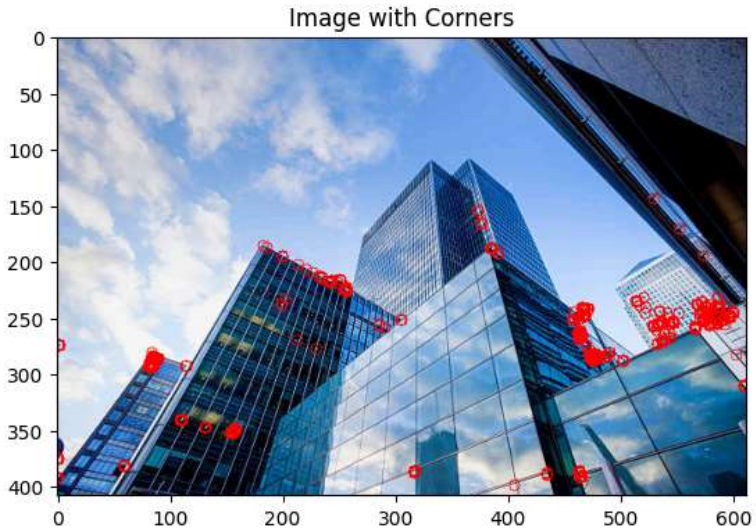
```
plt.imshow(img1_g,cmap='gray')
```

<matplotlib.image.AxesImage at 0x7e7de0c28f90>




```
[rows,cols]=img1_g.shape
R=cv2.cornerHarris(img1_g,3,3,0.04)
[rows,cols]=img1_g.shape

th_pos=0.2*R.max()


for r in range(0,rows):
    for c in range(0,cols):
        if R[r,c]>th_pos:
            cv2.circle(img1,(c,r),5,(255,0,0),1)


plt.imshow(img1)
plt.title("Image with Corners")
```

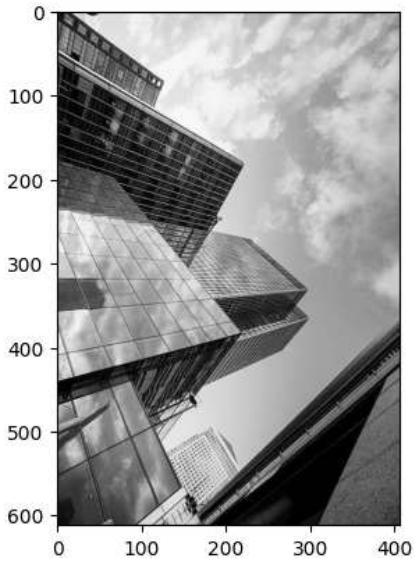
```
Text(0.5, 1.0, 'Image with Corners')
```



ROTATION INVARIANT PROOF

```
img3 = image.copy()

img3 = cv2.rotate(img3, cv2.ROTATE_90_CLOCKWISE)

img3_g= cv2.cvtColor(img3, cv2.COLOR_RGB2GRAY)

plt.imshow(img3_g,cmap='gray')
```

```
<matplotlib.image.AxesImage at 0x7e7da9a50f90>
```




```
[rows,cols]=img3_g.shape
R=cv2.cornerHarris(img3_g,3,3,0.04)
th_pos=0.2*R.max()

for r in range(0,rows):
    for c in range(0,cols):
        if R[r,c]>th_pos:
            cv2.circle(img3,(c,r),5,(255,0,0),1)
```

```
plt.imshow(img3)
plt.title("Image with Corners")
```

```
Text(0.5, 1.0, 'Image with Corners')
```

CHANGE BRIGHTNESS

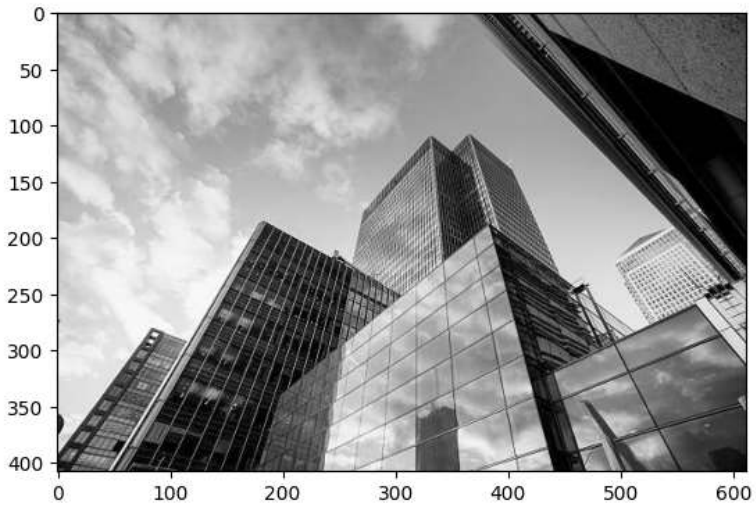
```
img4=image.copy()
```

```
img4_g = cv2.cvtColor(img4, cv2.COLOR_RGB2GRAY)
```

```
img4 = cv2.convertScaleAbs(img4_g,beta=1)
```

```
plt.imshow(img4_g,cmap='gray')
```

```
<matplotlib.image.AxesImage at 0x7e7da97e8b90>
```




```
[rows,cols]=img4_g.shape
R=cv2.cornerHarris(img4_g,3,3,0.04)
th_pos=0.2*R.max()
```

```
for r in range(0,rows):
    for c in range(0,cols):
        if R[r,c]>th_pos:
            cv2.circle(img4_g,(c,r),5,(255,0,0),1)
```

CONCLUSION

Harris Corner is used to detect corner and edges of the gien image building for the threshold of 20% of the minimum value of the corner