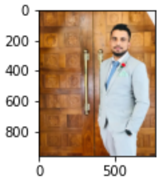
```
import cv2

import warnings
import matplotlib.pyplot as plt
import numpy as np
warnings.filterwarnings("ignore")
%matplotlib inline

plt.figure(figsize=(4, 2))
imagedata = plt.imread("/content/drive/MyDrive/Colab Notebooks/OpenCV/osa.jpg")
plt.imshow(imagedata)
plt.grid(False)
plt.show()
```



```
imagedata.shape[2]
```

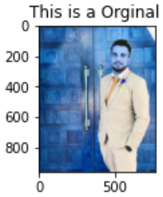
```
3
```

```
print("Image Shape: {}".format(imagedata.shape))
print("Image Size is : Image Height: {},  Image Width: {} and Image Channle: {} = {}".format(imagedata.shape[0], imagedata.shape[1], imagedat
```

```
Image Shape: (960, 768, 3)
Image Size is : Image Height: 960,  Image Width: 768 and Image Channle: 3 = 2211840
```

```
def osaimageShow(imageTitle, image):
    imageVariable = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
    plt.figure(figsize=(4, 2))
    plt.imshow(imageVariable)
    plt.title(imageTitle)
    plt.show()
```

```
osaimageShow("This is a Orginal ", imagedata)
```



```
imagedata.shape[:2]
```

```
(960, 768)
```

```
Image_mask = np.zeros(imagedata.shape[:2], dtype="uint8")
```

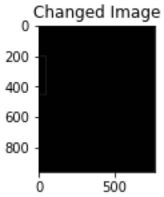
```
Image_mask
```

```
array([[0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       ...,
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0]], dtype=uint8)
```

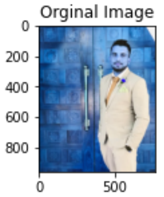
```
cv2.rectangle(Image_mask, (0, 450), (50, 200), 255)
```

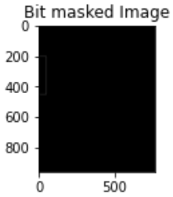
```
array([[0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       ...,
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0]], dtype=uint8)
```

```
osaimageShow("Changed Image", Image_mask)
```

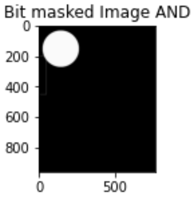


```
argmumentImage = {"Image":"/content/drive/MyDrive/Colab Notebooks/OpenCV/osa.jpg",
                  "scharr":0}
imagedata = plt.imread(argmumentImage["Image"])
osaimageShow("Orginal Image", imagedata)
bit_mask = cv2.bitwise_and(imagedata, imagedata, mask = Image_mask)
osaimageShow("Bit masked Image", Image_mask)
```

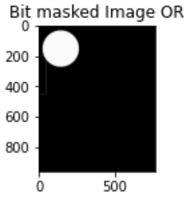




```
cv2.circle(Image_mask, (145, 150), 120, 250, -1)
bit_mask = cv2.bitwise_and(imagedata, imagedata, mask = Image_mask)
osaimageShow("Bit masked Image AND", Image_mask)
```



```
cv2.circle(Image_mask, (145, 150), 120, 250, -1)
bit_mask = cv2.bitwise_or(imagedata, imagedata, mask = Image_mask)
osaimageShow("Bit masked Image OR", Image_mask)
```



```
max(imagedata[0][0])
```

```
143
```

```
imagedata/255
```

```
array([[[0.56078431, 0.32941176, 0.16470588],
        [0.56078431, 0.32941176, 0.16470588],
        [0.56078431, 0.32941176, 0.16470588],
        ...,
        [0.94901961, 0.94901961, 0.94901961],
        [0.94117647, 0.94117647, 0.94117647],
        [0.9372549 , 0.9372549 , 0.9372549 ]],

       [[0.56470588, 0.33333333, 0.16862745],
        [0.56470588, 0.33333333, 0.16862745],
        [0.56470588, 0.33333333, 0.16862745],
        ...,
        [0.94901961, 0.94901961, 0.94901961],
        [0.94117647, 0.94117647, 0.94117647],
        [0.9372549 , 0.9372549 , 0.9372549 ]],

       [[0.56470588, 0.33333333, 0.16862745],
        [0.56470588, 0.33333333, 0.16862745],
        [0.56470588, 0.33333333, 0.16862745],
        ...,
        [0.94901961, 0.94901961, 0.94901961],
        [0.94117647, 0.94117647, 0.94117647],
        [0.9372549 , 0.9372549 , 0.9372549 ]],

       ...,

       [[0.38431373, 0.19607843, 0.00784314],
        [0.39607843, 0.19607843, 0.01176471],
        [0.41176471, 0.21568627, 0.02352941],
        ...,
        [0.29411765, 0.16862745, 0.07058824],
        [0.30588235, 0.18431373, 0.0745098 ],
        [0.31764706, 0.19607843, 0.08627451]],

       [[0.38431373, 0.19607843, 0.00784314],
        [0.39215686, 0.20392157, 0.01568627],
        [0.41176471, 0.21568627, 0.02352941],
        ...,
        [0.29019608, 0.17254902, 0.07058824],
        [0.30196078, 0.18431373, 0.0745098 ],
        [0.30980392, 0.19215686, 0.08235294]],

       [[0.38823529, 0.2       , 0.01176471],
        [0.39215686, 0.20392157, 0.01568627],
        [0.40784314, 0.21176471, 0.01960784],
        ...,
        [0.29019608, 0.17254902, 0.07058824],
        [0.30196078, 0.18431373, 0.0745098 ],
        [0.30196078, 0.19607843, 0.08235294]]])
```

```
customValueW = 120.0/imagedata.shape[1]
customValueH = 120.0/imagedata.shape[0]
```

```
customValueW
```

```
0.15625
```

```
customValueH
```

```
0.125
```

```
imagedata.shape[0]
```

```
960
```

```
imageDimention = (120, int(imagedata.shape[0]*customValueW))
```

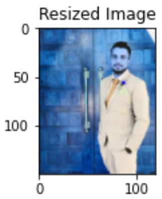
```
imagedata.shape
```

```
(960, 768, 3)
```

```
imageDimention
```

```
(120, 150)
```

```
newImage = cv2.resize(imagedata, imageDimention, interpolation = cv2.INTER_AREA)
osaimageShow("Resized Image", newImage)
```



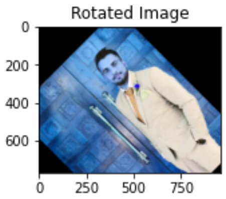
```
newImage.shape
```

```
(150, 120, 3)
```

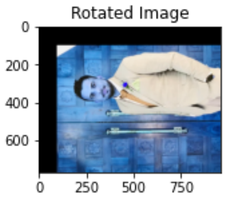
```
(imageH, ImageW) = imagedata.shape[:2]
```

```
centerX, centerY = (imageH//2, ImageW//2)
```

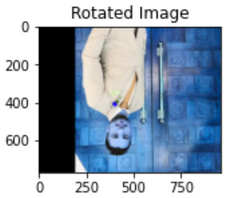
```
imageRotate = cv2.getRotationMatrix2D((centerX, centerY), 45, 1.0)
rotateNow = cv2.warpAffine(imagedata, imageRotate, (imageH, ImageW))
osaimageShow("Rotated Image", rotateNow)
```



```
imageRotate = cv2.getRotationMatrix2D((centerX, centerY), 90, 1.0)
rotateNow = cv2.warpAffine(imagedata, imageRotate, (imageH, ImageW))
osaimageShow("Rotated Image", rotateNow)
```



```
imageRotate = cv2.getRotationMatrix2D((centerX, centerY), 180, 1.0)
rotateNow = cv2.warpAffine(imagedata, imageRotate, (imageH, ImageW))
osaimageShow("Rotated Image", rotateNow)
```



```
grayimage = cv2.cvtColor(imagedata, cv2.COLOR_RGB2GRAY)
```

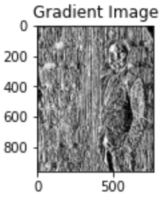
```
grayimage.shape
```

```
(960, 768)
```

```
kernelGen = -1 if argmumentImage["scharr"] > 0 else 3
```

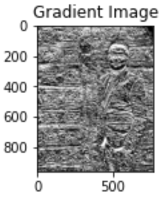
```
gradienImageDataX = cv2.Sobel(grayimage, ddepth = cv2.CV_32F, dx = 1, dy = 0, ksize = kernelGen)
gradienImageDataY = cv2.Sobel(grayimage, ddepth = cv2.CV_32F, dx = 0, dy = 1, ksize = kernelGen)
osaimageShow("Gradient Image", gradienImageDataX)
```

```
WARNING:matplotlib.image:Clipping input data to the valid range for imshow with RGB data ([0..1] for fl
```



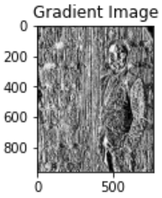
```
osaimageShow("Gradient Image", gradienImageDataY)
```

```
WARNING:matplotlib.image:Clipping input data to the valid range for imshow with RGB data ([0..1] for fl
```



```
osaimageShow("Gradient Image", gradienImageDataX)
```

```
WARNING:matplotlib.image:Clipping input data to the valid range for imshow with RGB data ([0..1] for fl
```



```
gradienImageDataX
```

```
array([[  0.,   0.,   4., ..., -12., -12.,   0.],
       [  0.,   0.,   4., ..., -12., -12.,   0.],
       [  0.,   0.,   4., ..., -11., -12.,   0.],
       ...,
       [  0.,  19.,  25., ...,  20.,  23.,   0.],
       [  0.,  18.,  24., ...,  20.,  21.,   0.],
       [  0.,  16.,  22., ...,  20.,  20.,   0.]], dtype=float32)
```

```
gradienImageDataY
```

```
array([[ 0.,  0.,  0., ...,  0.,  0.,  0.],
       [ 4.,  4.,  4., ...,  0.,  0.,  0.],
       [-4., -4., -4., ...,  1.,  2.,  2.],
       ...,
       [ 2.,  3.,  5., ...,  0., -1., -2.],
       [ 4.,  2., -2., ...,  0., -1., -2.],
       [ 0.,  0.,  0., ...,  0.,  0.,  0.]], dtype=float32)
```

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