

CIS 515: COMPUTER GRAPHICS

LAB – 1

UNIVERSITY OF MICHIGAN – DEARBORN

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BY,

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## TASK 1 - NumPy:

```
import numpy as np
```

```
A = np.array([[1, 2, 3], [4, 5, 6]])  
print("Shape of A:", A.shape)
```

```
B = A.reshape(3, 2)  
print("Shape of B:", B.shape)
```

```
C = np.transpose(B)
```

```
print("Shape of C:", C.shape)
```

```
D = np.concatenate((A, C), axis=0)
```

```
print("Shape of D:", D.shape)
```

```
print("Content of D: \n", D)
```

```
E = A.copy()
```

```
E[0, 0] = 10
```

```
print("Content of A:\n", A)
```

```
print("Content of E:\n", E)
```

```
/home/vishvendra/Documents/Projects/Python/515/.venv/bin/python /home/vishvendra/Documents/Projects/Python/515/main.py  
Shape of A: (2, 3)  
Shape of B: (3, 2)  
Shape of C: (2, 3)  
Shape of D: (4, 3)  
Content of D:  
[[1 2 3]  
 [4 5 6]  
 [1 3 5]  
 [2 4 6]]  
Content of A:  
[[1 2 3]  
 [4 5 6]]  
Content of E:  
[[10  2  3]  
 [ 4  5  6]]  
  
Process finished with exit code 0
```

## TASK 2 – Image Processing:

```
import cv2
import matplotlib.pyplot as plt

x1 = cv2.imread('./pic/flower.jpg')
plt.imshow(cv2.cvtColor(x1, cv2.COLOR_BGR2RGB))
plt.show()

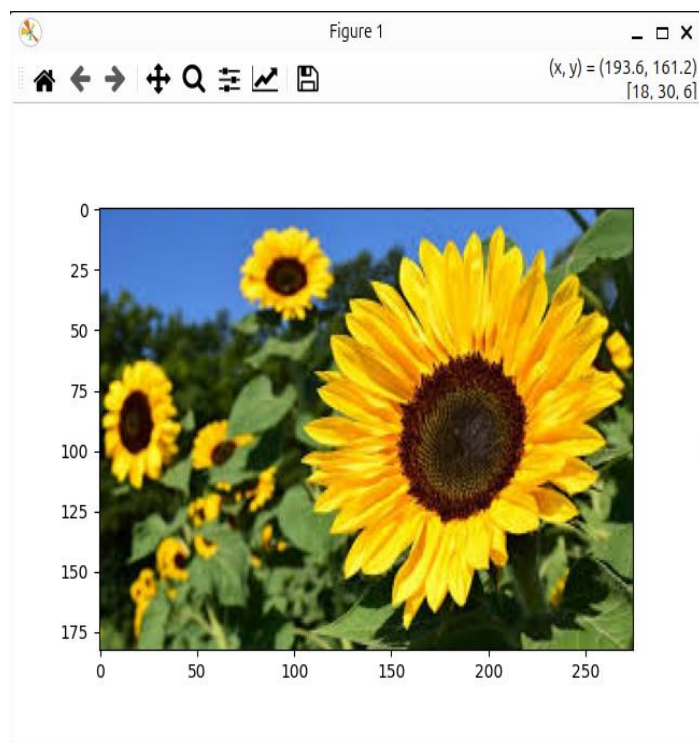
x2 = cv2.cvtColor(x1, cv2.COLOR_BGR2GRAY)
plt.imshow(x2, 'grey')
plt.show()

x3 = cv2.rotate(x1, cv2.ROTATE_90_CLOCKWISE)
plt.imshow(cv2.cvtColor(x3, cv2.COLOR_BGR2RGB))
plt.show()

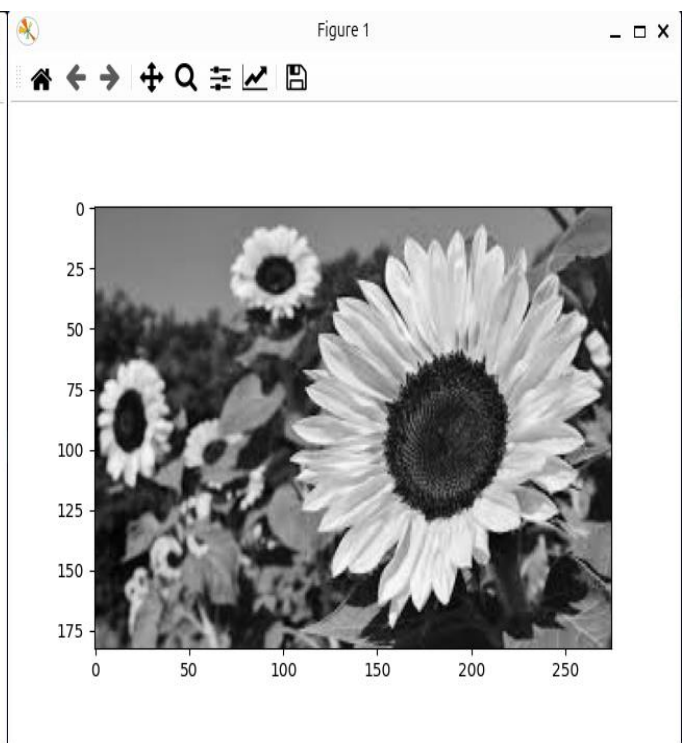
x4 = cv2.resize(x1, (137, 91))
plt.imshow(cv2.cvtColor(x4, cv2.COLOR_BGR2RGB))
plt.show()

x5 = x1[45:137, 68:206]
plt.imshow(cv2.cvtColor(x5, cv2.COLOR_BGR2RGB))
cv2.imwrite('x5.jpg', x5)
plt.show()
```

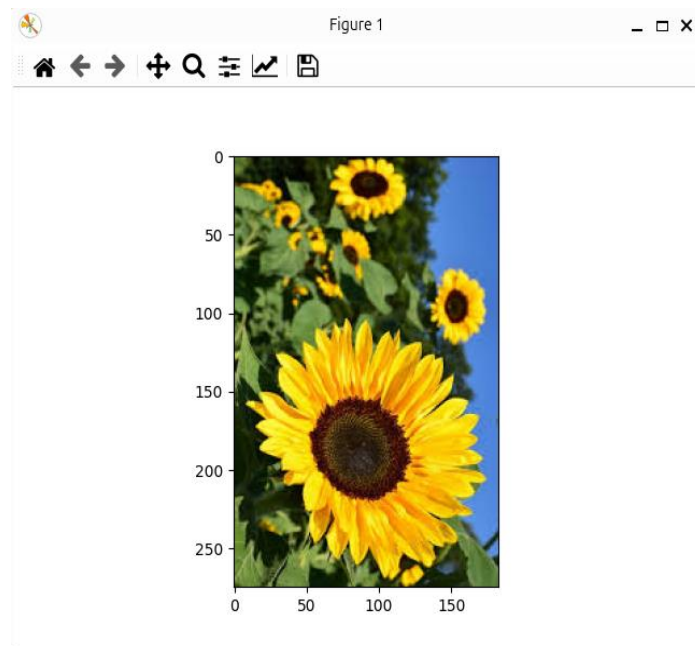
### 2. b) REGULAR IMAGE



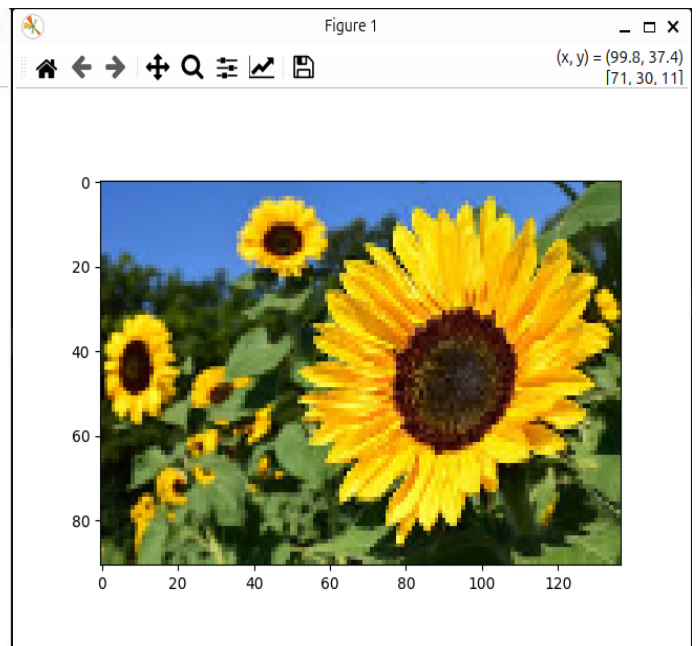
### 2. d) GRAYSCALE IMAGE



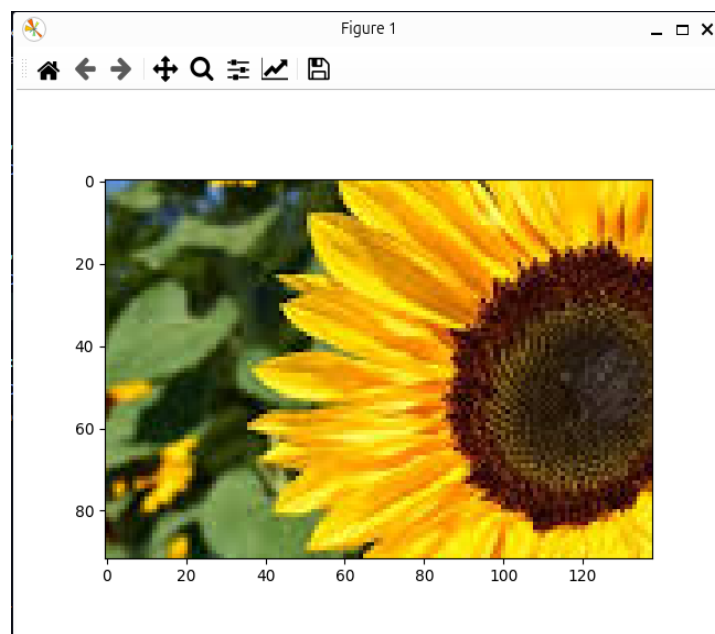
## 2. f) IMAGE ROTATED TO 90 DEGREES



## 2. h) IMAGE SCALED DOWN TO HALF SIZE



## 2. j) CROPPED AROUND ITS CENTROID



### TASK 3 – Color Segmentation:

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

image = cv2.imread('./pic/stopSign.png')
image_rgb = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
result = image.copy()
image_hsv = cv2.cvtColor(image, cv2.COLOR_BGR2HSV)

l1 = np.array([0, 100, 20])
u1 = np.array([10, 255, 255])

l2 = np.array([160, 100, 20])
u2 = np.array([180, 255, 255])

lm = cv2.inRange(image_hsv, l1, u1)
um = cv2.inRange(image_hsv, l2, u2)

mask = lm + um
result = cv2.bitwise_and(result, result, mask=mask)
result_rgb = cv2.cvtColor(result, cv2.COLOR_BGR2RGB)

plt.imshow(image_rgb)
plt.show()

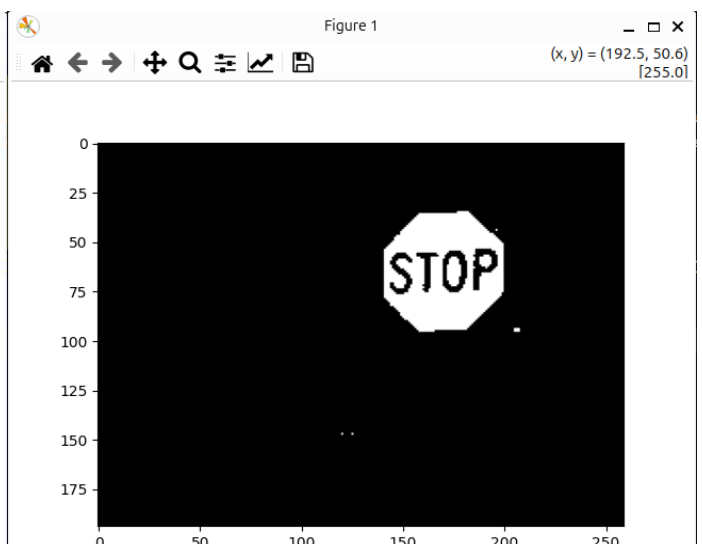
plt.imshow(mask, 'grey')
plt.show()

plt.imshow(result_rgb)
plt.show()
```

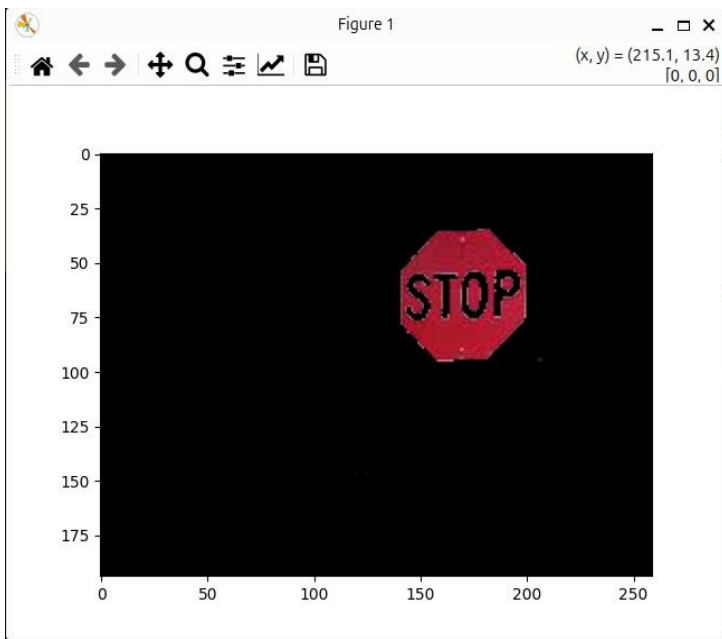
**ORIGINAL PICTURE**



**MASK**



## RESULT



### TASK 4 - Segmentation of Yellow Traffic Sign:

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

image = cv2.imread('./pic/Yellow_traffic_sign.png')
image_rgb = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
result = image.copy()
image_hsv = cv2.cvtColor(image, cv2.COLOR_BGR2HSV)

l1 = np.array([20, 100, 100])
u1 = np.array([30, 255, 255])

mask = cv2.inRange(image_hsv, l1, u1)
result = cv2.bitwise_and(result, result, mask=mask)
result_rgb = cv2.cvtColor(result, cv2.COLOR_BGR2RGB)

plt.imshow(image_rgb)
plt.show()

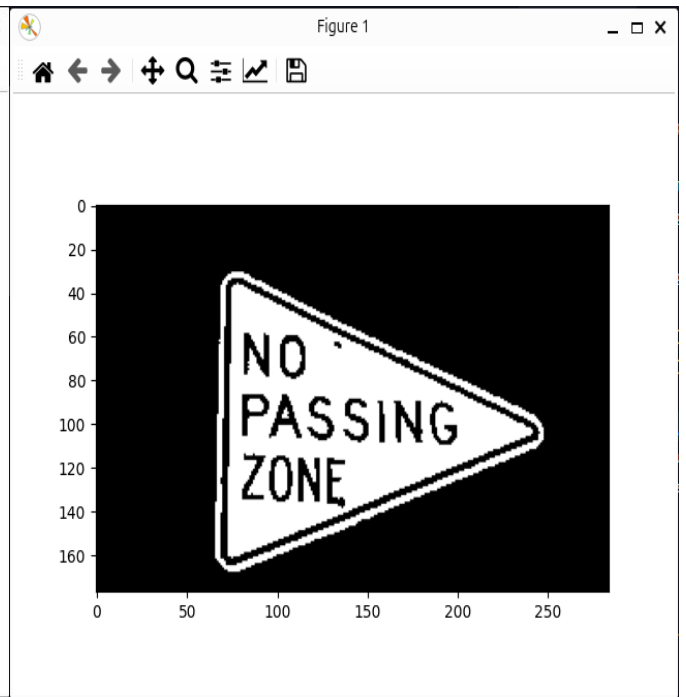
plt.imshow(mask, 'grey')
plt.show()

plt.imshow(result_rgb)
plt.show()
```

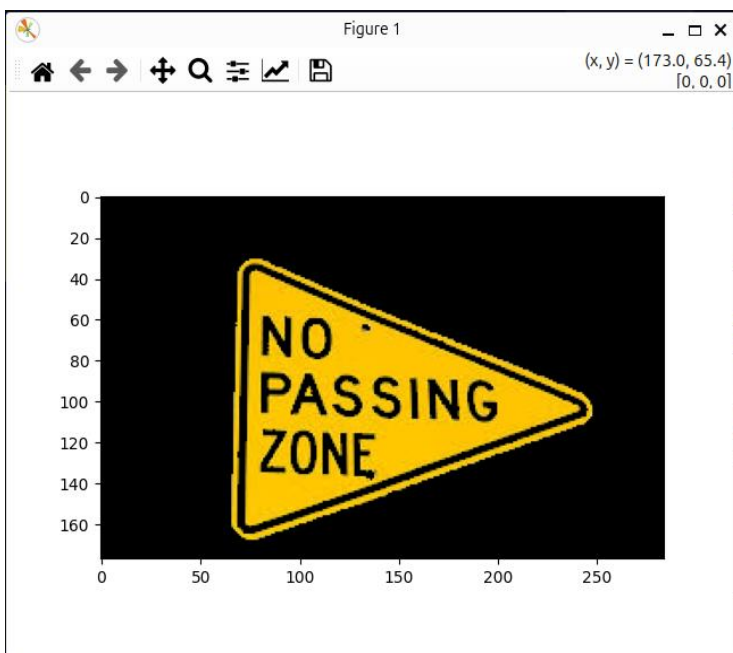
ORIGINAL PICTURE



MASK



RESULT



## TASK 5 – Pillow:

```
import PIL
from PIL import Image

y1 = Image.open('./pic/flower.jpg')
y1.show()

y2 = y1.rotate(25, expand=1)
y2.show()

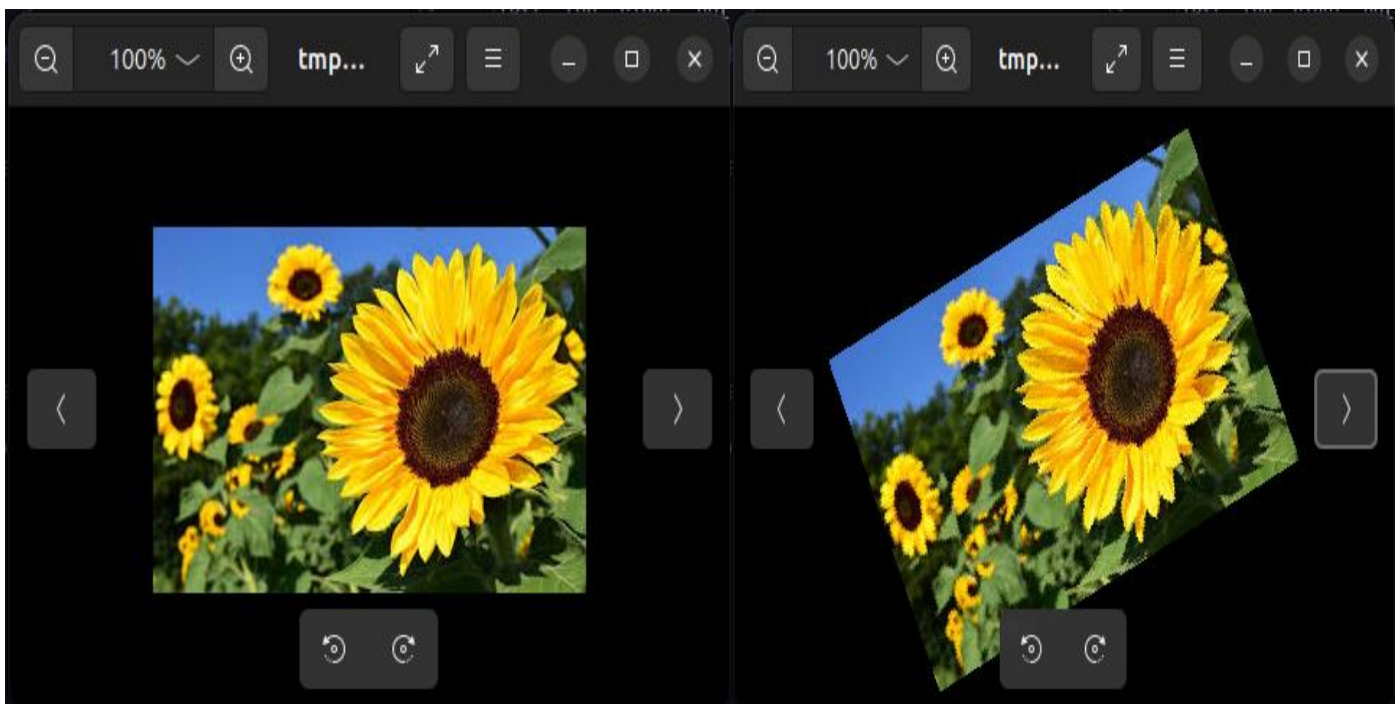
print(y2.size)

width, height = y1.size
left, top, right, bottom = 4, height/5, width/2, 3*height/5
y3 = y1.crop((left, top, right, bottom))
y3.show()

newsize = (128, 128)
y4 = y1.resize(newsize)
y4.show()
y4.save('resized_image.png')
```

ORIGINAL IMAGE

ROTATED IMAGE BY 25 DEGREES



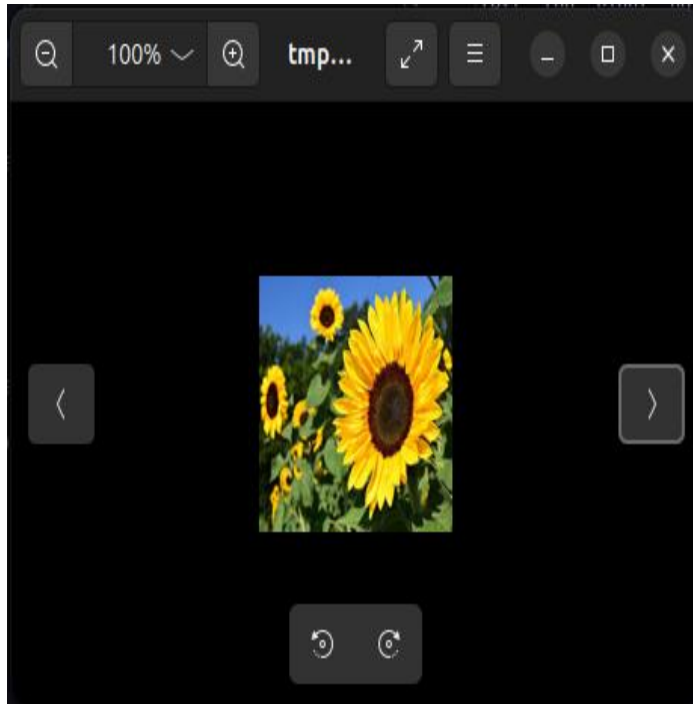


## WIDTH AND HEIGHT OF y2

```
/home/vishvendra/Documents/Projects/Python/515/.venv/bin/python /home/vishvendra/Documents/Projects/Python/515/task  
(327, 283)
```

Process finished with exit code 0

y3 CROPPED IMAGE



y4 newsize IMAGE

