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1. Download an image from the net.
2. Read and display that image using opencv.
3. Perform cropping, rotation, flipping operation on it.
4. Display different channels of the image.
5. Convert that image to gray scale image.
6. Note the size and dimensions of the image.
7. Draw a rectangle of Blue color of width 4.
8. Perform negative, thresholding and adaptive thresholding on the grayscale image.
9. Save the output images with their names.

```
import cv2
from google.colab import files
uploaded=files.upload()
```

Choose Files sunflower.jpg

- **sunflower.jpg**(image/jpeg) - 279544 bytes, last modified: 6/23/2021 - 100% done

```
Saving sunflower.jpg to sunflower.jpg
```

```
from matplotlib import pyplot as plt
```

```
image = cv2.imread("sunflower.jpg")
from google.colab.patches import cv2_imshow
cv2_imshow(image)
```

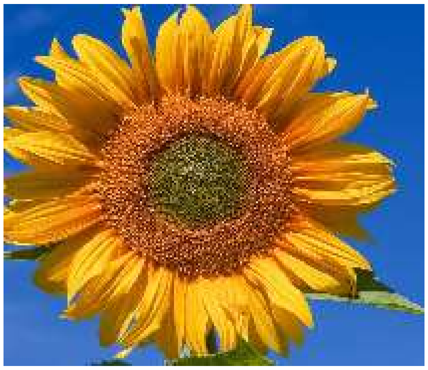
CROP

```
resized = cv2.resize(image, (300, 300))
cv2_imshow(resized)
```

Extract a 300x300 pixel square ROI (Region of Interest) from the input image START: (40,40) END: (250, 220)

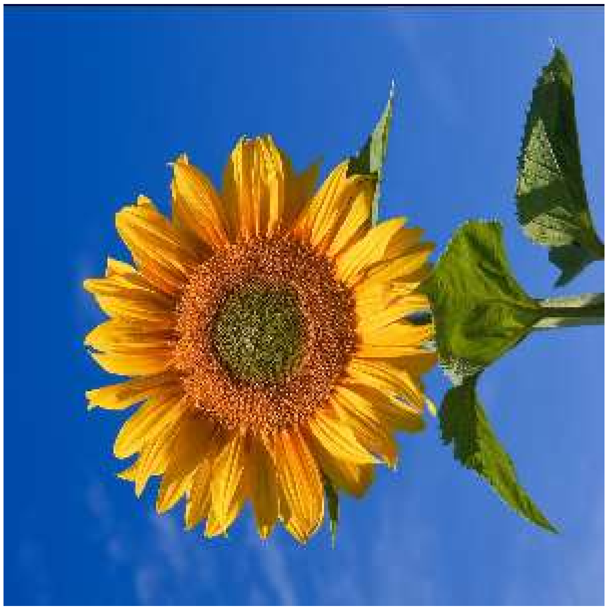
image[startY:endY, startX:endX]

```
roi = resized[40:220, 40:250]
cv2_imshow(roi)
```



ROTATION

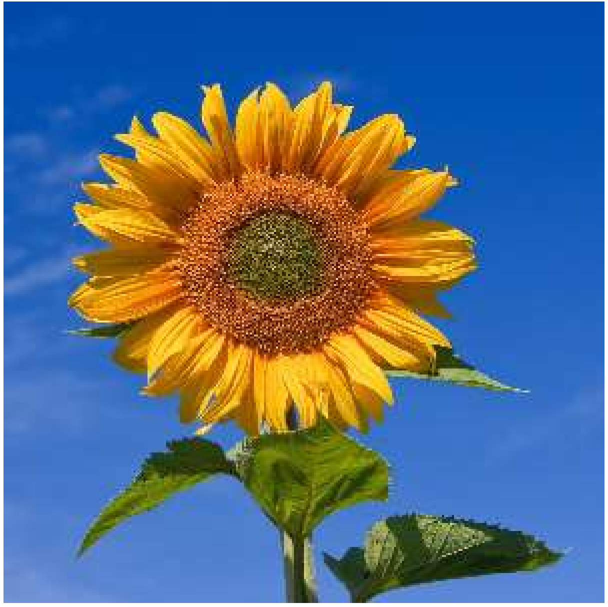
```
import imutils as im
rotated = im.rotate(resized, 90)
cv2_imshow(rotated)
```



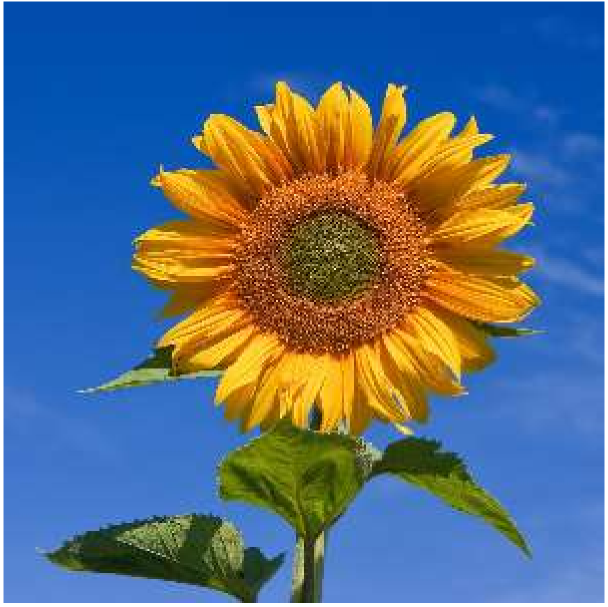
FLIP

```
import numpy as np
img1=np.flipud(resized) # flip vertically

print("Original Image")
cv2_imshow(resized)

print("FLIP horizontally")
img2=np.fliplr(resized) #flip horizontally
cv2_imshow(img2)

print("FLIP Vertically")
cv2_imshow(img1)
```

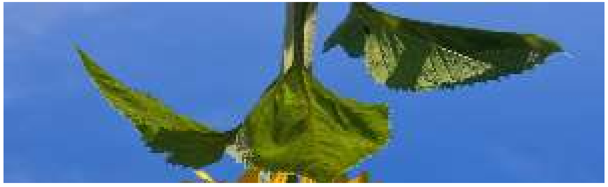
```
Original Image
```



```
FLIP horizontally
```



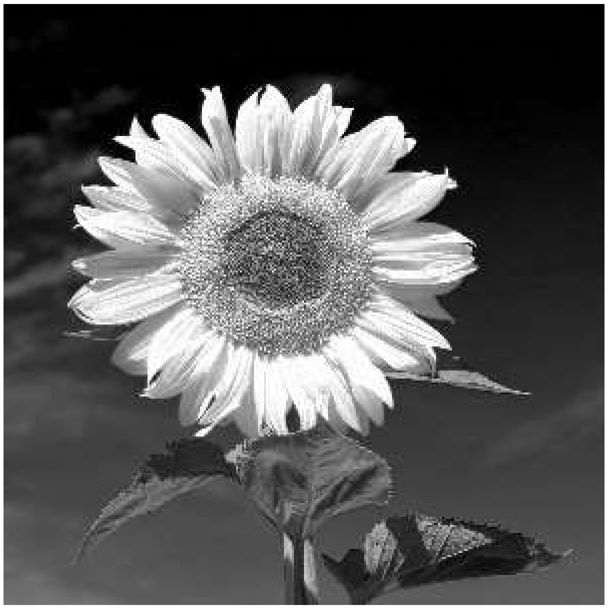
```
FLIP Vertically
```



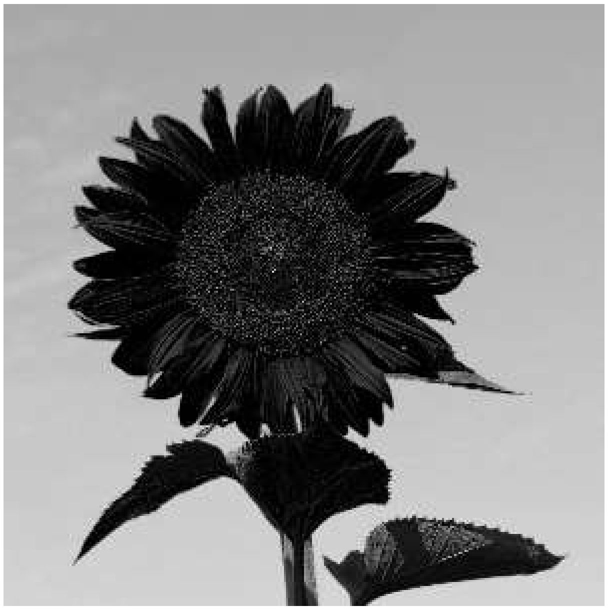
Display different channels of the image.

```
blue, green, red = cv2.split(resized) # Split the image into its channels
print("RED CHANNEL")
cv2_imshow(red) # Display the red channel in the image
print("BLUE CHANNEL")
cv2_imshow(blue) # Display the red channel in the image
print("GREEN CHANNEL")
cv2_imshow(green) # Display the red channel in the image
```

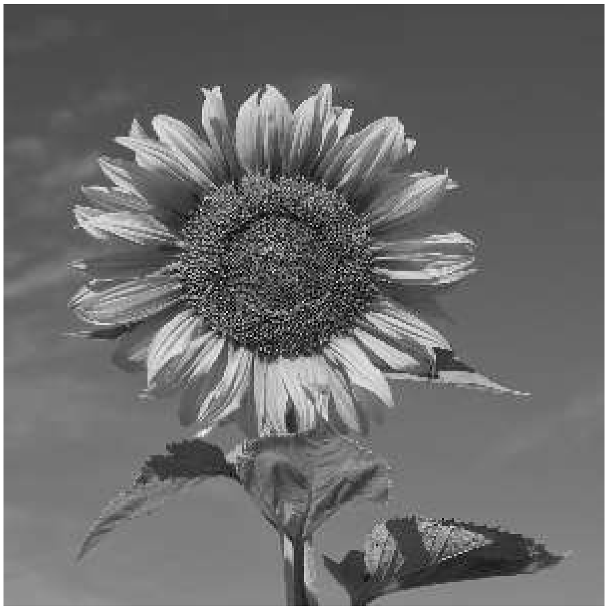
```
RED CHANNEL
```



```
BLUE CHANNEL
```



```
GREEN CHANNEL
```



Convert that image to gray scale image.

```
gray = cv2.cvtColor(resized, cv2.COLOR_BGR2GRAY)
cv2_imshow(gray)
```

Note the size and dimensions of the image.

```
print("Image Properties")
print("- Number of Pixels: " + str(resized.size))
print("- Shape/Dimensions: " + str(resized.shape))
sz=resized.size
print("- Size={}".format(sz))
(h, w, d) = resized.shape
print("width={}, height={}, depth={}".format(w, h, d))
```

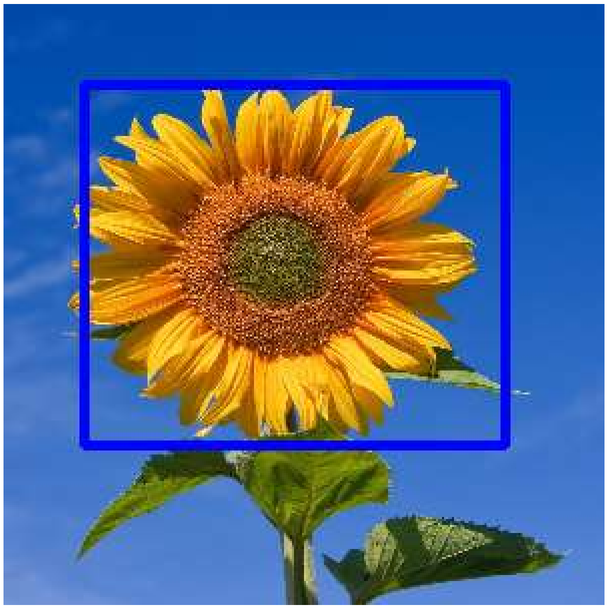
```
Image Properties
- Number of Pixels: 270000
- Shape/Dimensions: (300, 300, 3)
- Size=270000
width=300, height=300, depth=3
```

Draw a rectangle of Blue color of width 4.

Syntax: cv2.rectangle(image, start_point, end_point, color, thickness)

```
output = resized.copy()
cv2.rectangle(output, (40, 40), (250,220), (255, 0, 0), 4) #START: (40,40) END: (250, 220)
```

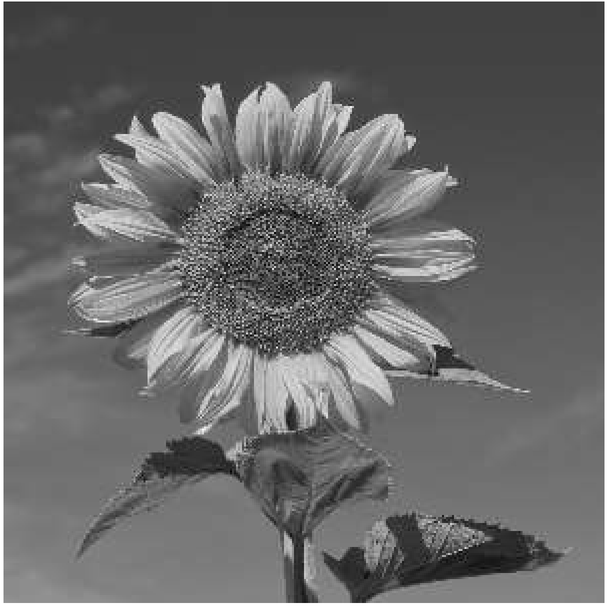
```
cv2.rectangle(output, (40, 40), (250,220), (255, 0, 0), 4) #START: (40,40) END: (250, 220)
cv2_imshow(output)
```



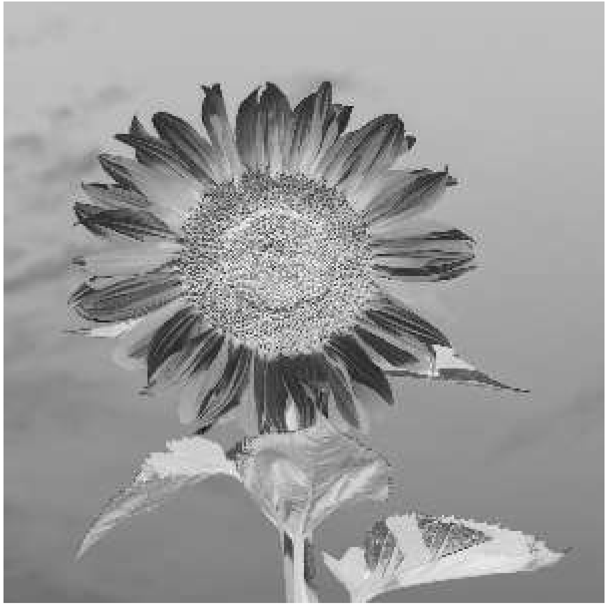
Perform negative, thresholding and adaptive thresholding on the grayscale image.

```
print('Grayscale Image')
cv2_imshow(gray)

#Performing Digital Negative
max_intensity = 255
(h, w) = gray.shape
output = gray.copy()
for i in np.arange(h):
  for j in np.arange(w):
    a = output.item(i,j)
    b = max_intensity - a
    output.itemset((i,j), b)
print("Digital Negative")
cv2_imshow(output)

# Perform binary thresholding on the image with T = 125
#cv2.threshold:
#First argument - the source image, which should be a grayscale image.
#Second argument - the threshold value which is used to classify the pixel values.
#Third argument - the maxVal which represents the value to be given if pixel value is more th
ret,thresh1 = cv2.threshold(gray, 125, 255, cv2.THRESH_BINARY)
print("Thresholding")
cv2_imshow(thresh1)
```

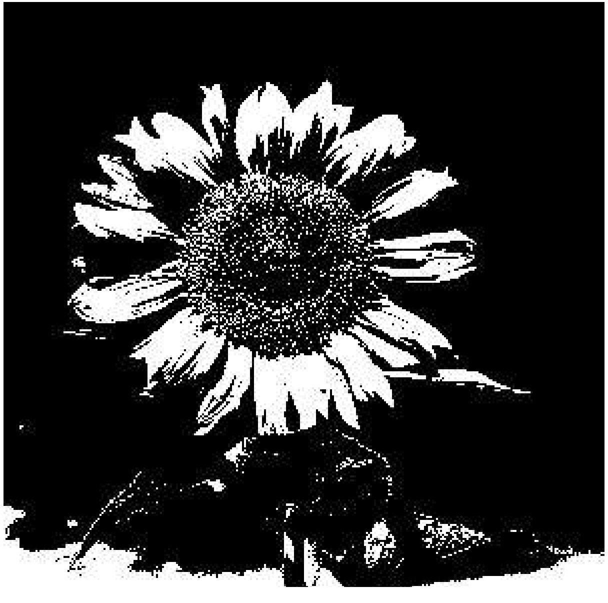
```
Grayscale Image
```



```
Digital Negative
```

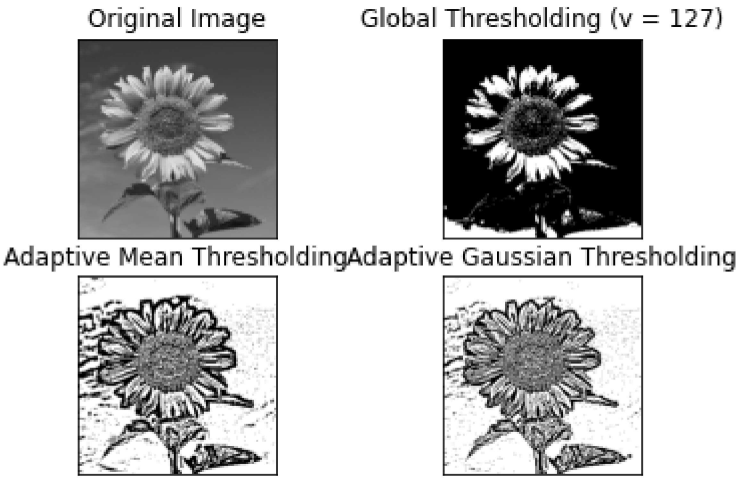


```
Thresholding
```



```
#ADAPTIVE THRESHOLD
```

```
ret,th1 = cv2.threshold(gray,127,255,cv2.THRESH_BINARY)
th2 = cv2.adaptiveThreshold(gray,255,cv2.ADAPTIVE_THRESH_MEAN_C,\
            cv2.THRESH_BINARY,11,2)
th3 = cv2.adaptiveThreshold(gray,255,cv2.ADAPTIVE_THRESH_GAUSSIAN_C,\
            cv2.THRESH_BINARY,11,2)

titles = ['Original Image', 'Global Thresholding (v = 127)',
            'Adaptive Mean Thresholding', 'Adaptive Gaussian Thresholding']
images = [gray, th1, th2, th3]

for i in range(4):
    plt.subplot(2,2,i+1),plt.imshow(images[i],'gray')
    plt.title(titles[i])
    plt.xticks([]),plt.yticks([])
plt.show()
```


Original Image
Global Thresholding (v = 127)
Adaptive Mean Thresholding
Adaptive Gaussian Thresholding