#### Goal

#### In this chapter,

\* We will learn how to threshold images.

\* We will see: cv2.threshold()

### Theory

Thresholding is the simplest method of image segmentation. From a grayscale image, thresholding can be used to create binary images. Here, the matter is straight forward. If pixel value is greater than a threshold value, it is assigned one value (may be white), else it is assigned another value (may be black). The function used is cv2.threshold. First argument is the source image, which should be a grayscale image. Second argument is the threshold value which is used to classify the pixel values. Third argument is the maxVal which represents the value to be given if pixel value is more than (sometimes less than) the threshold value. OpenCV provides different styles of thresholding and it is decided by the fourth parameter of the function. Different types are:

- cv2.THRESH\_BINARY
- cv2.THRESH BINARY INV
- cv2.THRESH TOZERO
- cv2.THRESH\_TRUNC
- cv2.THRESH\_TOZERO\_INV

How to use the function?

The function takes three inputs. First is the source image(img), second argument is the threshold value which is used to classify the pixel values. Third argument is the Max\_value which represents the value to be given if pixel value is more than (sometimes less than) the threshold value.

cv2.threshold(img, 127, 255, cv2.THRESH\_BINARY)

#### Code

Below we will see an example on how to use thresholding to images. Consider the sunflower image below:



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\* IMAGE PROCESSING ( THRESHOLDING OPERATION )

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\* MENTOR : SANAM SHAKYA

\* FILENAME : THRESHOLDING.PY

\* THEME : DEVELOP MODULES FOR IMAGE PROCESSING AND ROBOT LOCALISATION

\* USING MARKERS

\* FUNCTIONS : cv3.threshold(), cv2.cvtColor(), cv2.imread()

\* GLOBAL VARIABLES : NONE

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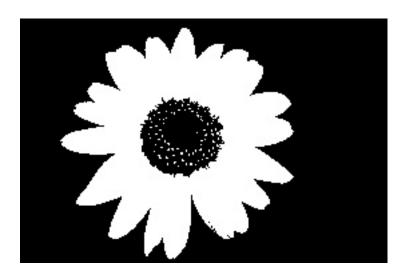
```
Initialisation of the camera is done by the function cv2.imread
img = cv2.imread('sun.jpg')
To convert the image into grayscale we use the command
cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
* FUNCTION NAME : ret,thresh = cv2.threshold(img, Min_value,Max_value,cv2.THRESH_BINARY)
* INPUT
              : Input is a source image which should be in grayscale.
* OUTPUT
              : A thresholded image will be displayed.
* LOGIC
              : The function takes three inputs. First is the source image(img),
                second argument is the threshold value which is used to classify the
                pixel values.
                Third argument is the Max_value which represents the value to be given
                if pixel value is more than (sometimes less than) the threshold value.
* EXAMPLE CALL : ret,thresh = cv2.threshold(img, 0, 255, cv2.THRESH_BINARY)
* ADITIONAL INFO: Different types are:
                cv2.THRESH_BINARY
                cv2.THRESH_BINARY_INV
                cv2.THRESH TRUNC
                cv2.THRESH TOZERO
                cv2.THRESH_TOZERO_INV
ret, thresh = cv2.threshold(gray, 127, 255, cv2.THRESH_BINARY)
ret, thresh1 = cv2.threshold(gray,127,255,cv2.THRESH_BINARY_INV)
ret, thresh2 = cv2.threshold(gray, 127, 255, cv2.THRESH TRUNC)
ret, thresh3 = cv2.threshold(gray,127,255,cv2.THRESH_TOZERO)
ret, thresh4 = cv2.threshold(gray,127,255,cv2.THRESH_TOZERO_INV)
* To display the image we use the function cv2.imshow()
cv2.imshow("Thresh", thresh)
cv2.imshow("Thresh1", thresh1)
cv2.imshow("Thresh2", thresh2)
cv2.imshow("Thresh3", thresh3)
cv2.imshow("Thresh4", thresh4)
```

111

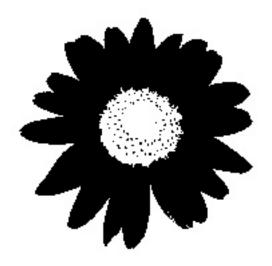
```
* cv2.waitKey() - Waits for the user to click any key.
* cv2.destroyAllWindows() - Closes all output tabs.
'''
cv2.waitKey(0)
cv2.destroyAllWindows()
```

#### Output Images:

### 1) Thresh Binary



# 2) Thresh Binary Inverse



# 3) Thresh Trunc



# 4) Thresh To Zero



# 5) Thresh To Zero Inv



# Additional Resources

 $1) \ \ http://docs.opencv.org/doc/tutorials/imgproc/threshold/threshold.html$ 

# Excercises