HW-1

Q2

Quick Idea:
We will count the **number of connected components** in the given binary image formed by **white** color pixels. The number of connected components is found by **coloring each component** with **different** colors and the **number of colors** used denotes the number of components.

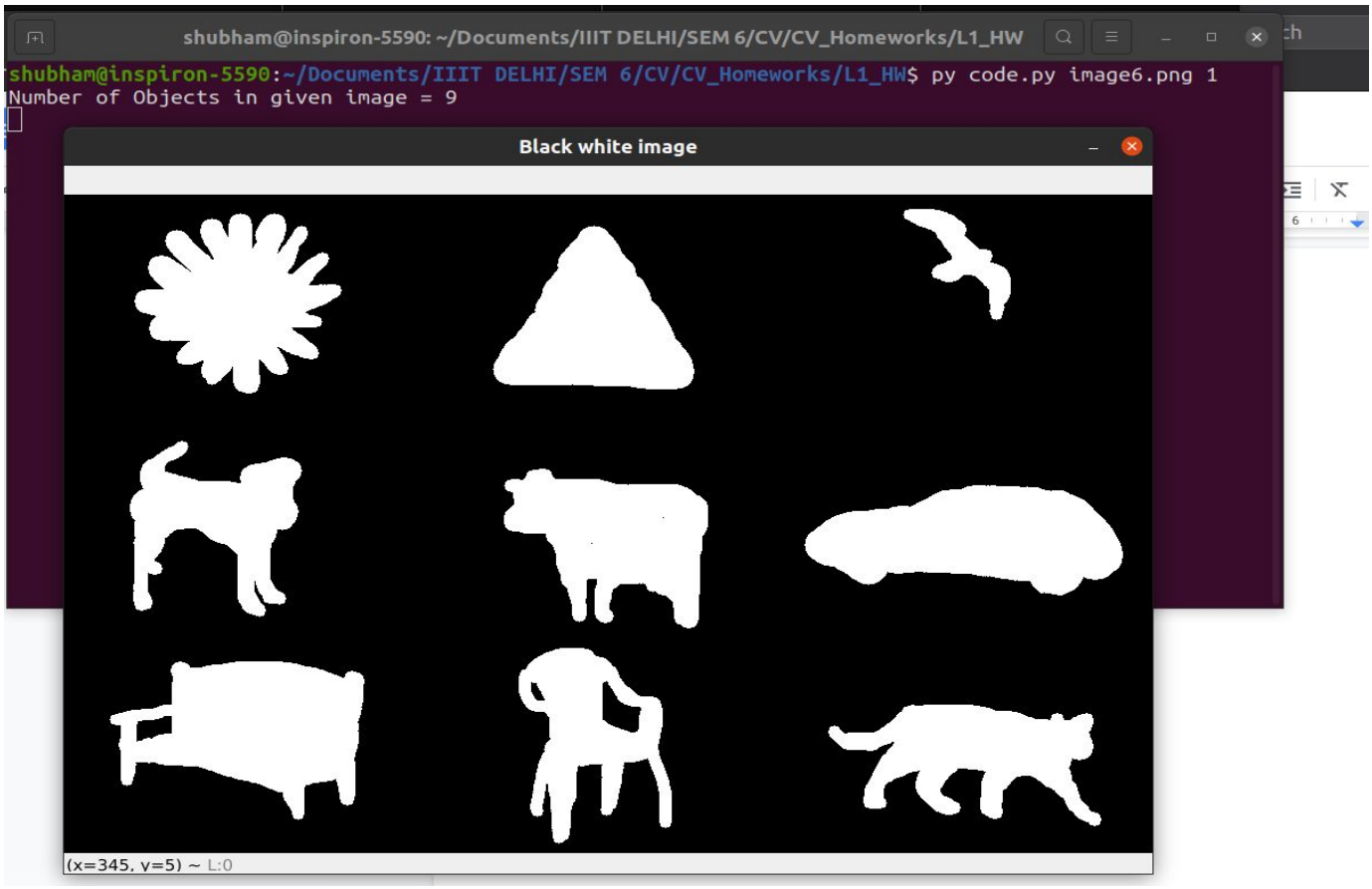
Algorithm:

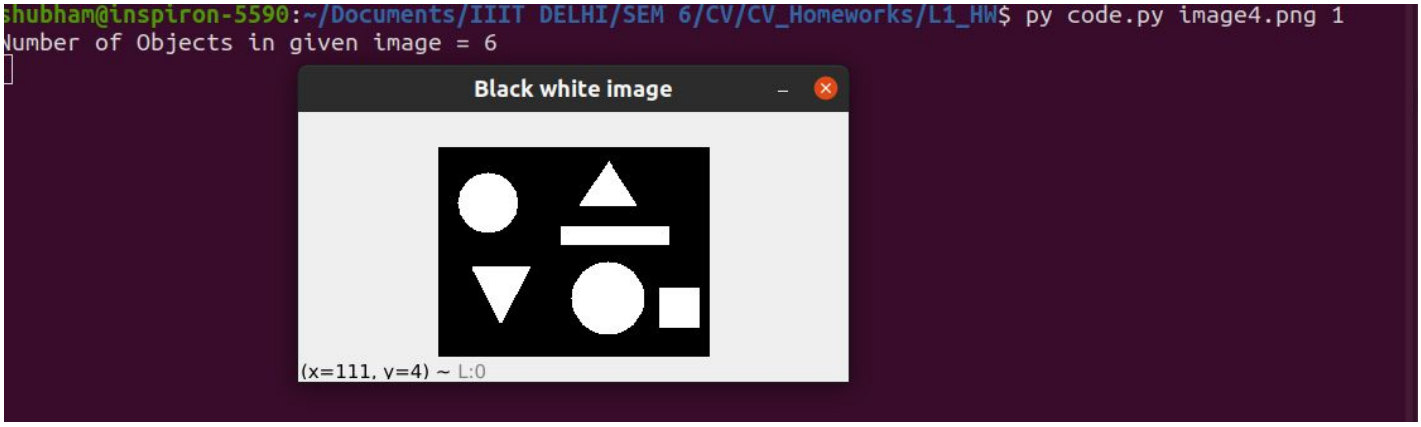
1. Let **bw_image** denote the 2-D matrix of pixels of the given image.
2. Iterate the matrix from **left to right** and **top to bottom**, pixel by pixel.
3. Suppose, we are at the pixel in the **i^{th}** row and **j^{th}** column of **bw_image**.
4. If the current pixel is **black** then do nothing and move to the next pixel and repeat from **step-3**.
5. If the pixel is **white**:
    a. Then mark that pixel with some value(denoted by variable **color)**
    b. See if any of the nearby pixels(at max 8 pixels, if they exist obviously) is also white then color each of them with the same color as we colored the current pixel and apply **step-b** again on each of these nearby pixels **recursively**. This is called **BFS/ Flood Fill algorithm.**
    c. Repeat **step-b** till it is possible to apply.
    d. Increase the value of the variable **color** by **1**.
    e. Move to the next pixel and repeat from step-3.
6. After traversing the matrix as described in **step-2**, the value of the variable **color** denotes the **number of components**, which in turn is **equal** to the **number of objects** in the given binary image.

Brief Implementation Details/Assumptions:

- If the given image is colored then it is converted into binary using the **OpenCV** module.
- **White** color is denoted by value **255** while the **black** color is denoted by value **0.**
- So, instead of increasing the value of variable **color**, we **decrease** its value so that they do not conflict due to the above particular values of white and black color.
- And we take the **absolute value** of **color** as our required answer since it will be negative.

Output:


shubham@inspiron-5590: ~/Documents/IIIT DELHI/SEM 6/CV/CV_Homeworks/L1_HW
shubham@inspiron-5590:~/Documents/IIIT DELHI/SEM 6/CV/CV_Homeworks/L1_HW$ py code.py image6.png 1
Number of Objects in given image = 9
Black white image
(x=345, y=5) ~ L:0


shubham@inspiron-5590:~/Documents/IIIT DELHI/SEM 6/CV/CV_Homeworks/L1_HW$ py code.py image4.png 1
Number of Objects in given image = 6
Black white image
(x=111, y=4) ~ L:0

```
shubham@inspiron-5590:~/Documents/IIIT DELHI/SEM 6/CV/CV_Homeworks/L1_HW$ py code.py image5.png 1
Number of Objects in given image = 18
```