Histogram and Histogram Equalization of an image

Aim

To obtain a histogram for finding the frequency of pixels in an Image with pixel values ranging from 0 to 255. Also write the code using OpenCV to perform histogram equalization.

Software Required:

Anaconda - Python 3.7

ALGORITHM:

Step 1:

Import the necessary libraries and read two images, Color image and Gray Scale image.

Step 2:

Calculate the Histogram of Gray scale image and each channel of the color image.

Step 3:

Display the histograms with their respective images.

Step 4:

Equalize the grayscale image.

Program:

```
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# FOR GRAY IMAGE
## code to read and show the input image
import cv2
import matplotlib.pyplot as plt
gray_image =cv2.imread('MESSI.PNG',0)
cv2.imshow('gray_image',gray_image)
cv2.waitKey(0)
cv2.destroyAllWindows()



# code to find the histogram of the image
```

```
hist = cv2.calcHist([gray_image],[0],None,[256],[0,255])


# Display the histogram graph of the image

plt.figure()
plt.title("Histogram")
plt.xlabel('grayscale value')
plt.ylabel('pixel count')
plt.stem(hist)
plt.show()


# code to perform histogram equalization of the image.

equ_g = cv2.equalizeHist (gray_image)


# code to show histogram equalized image.

cv2.imshow('EQUALIZED IMAGE',equ_g)
cv2.waitKey(0)
cv2.destroyAllWindows()


# code to find the histogram of the equalized image

equal_hist = cv2.calcHist([equ_g],[0],None,[256],[0,255])


# Display the equalized histogram graph of gray scale image

plt.figure()
plt.title("Histogram")
plt.xlabel('grayscale value')
plt.ylabel('pixel count')
plt.stem(equal_hist)
plt.show()
```

FOR COLOR IMAGE:

```
# code to read and show the input image

import cv2
import matplotlib.pyplot as plt
color_image =cv2.imread('MESSI.PNG',-1)
cv2.imshow('color_img',color_image)
cv2.waitKey(0)
cv2.destroyAllWindows()
```

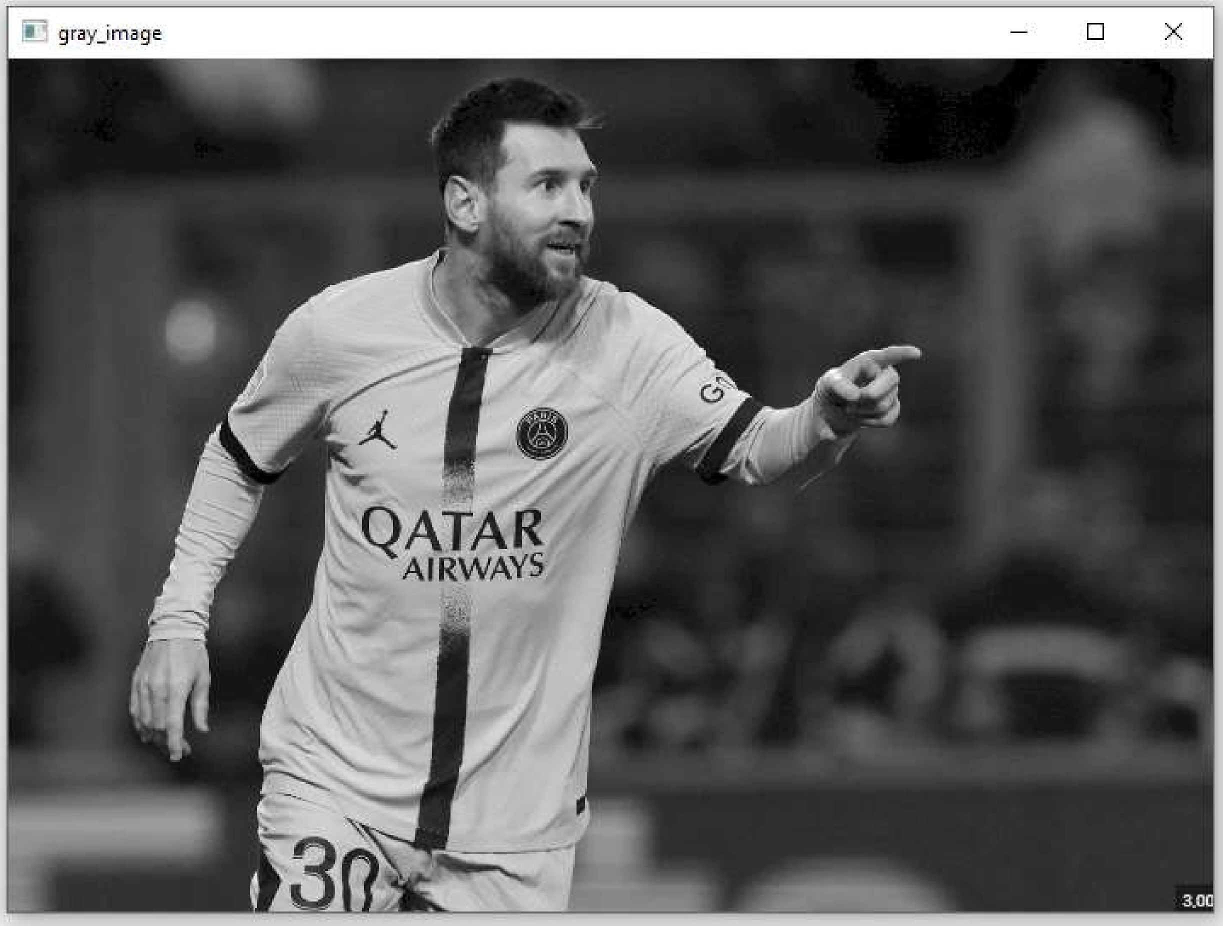
```
# code to calculate the histogram of different channels of color image

hist0 = cv2.calcHist([color_image],[0],None,[256],[0,255]) #channel 0 - blue
hist1 = cv2.calcHist([color_image],[1],None,[256],[0,255]) #channel 1 - green
hist2 = cv2.calcHist([color_image],[2],None,[256],[0,255]) #channel 2 - red




# Display the histogram graph of different channels of color image

#channel 0 - blue
plt.figure()
plt.title("Histogram")
plt.xlabel('blue value')
plt.ylabel('pixel count')
plt.stem(hist0)
plt.show()

#channel 1 - green
plt.figure()
plt.title("Histogram")
plt.xlabel('green value')
plt.ylabel('pixel count')
plt.stem(hist1)
plt.show()

#channel 2 - red
plt.figure()
plt.title("Histogram")
plt.xlabel('red value')
plt.ylabel('pixel count')
plt.stem(hist2)
plt.show()
```

Output:

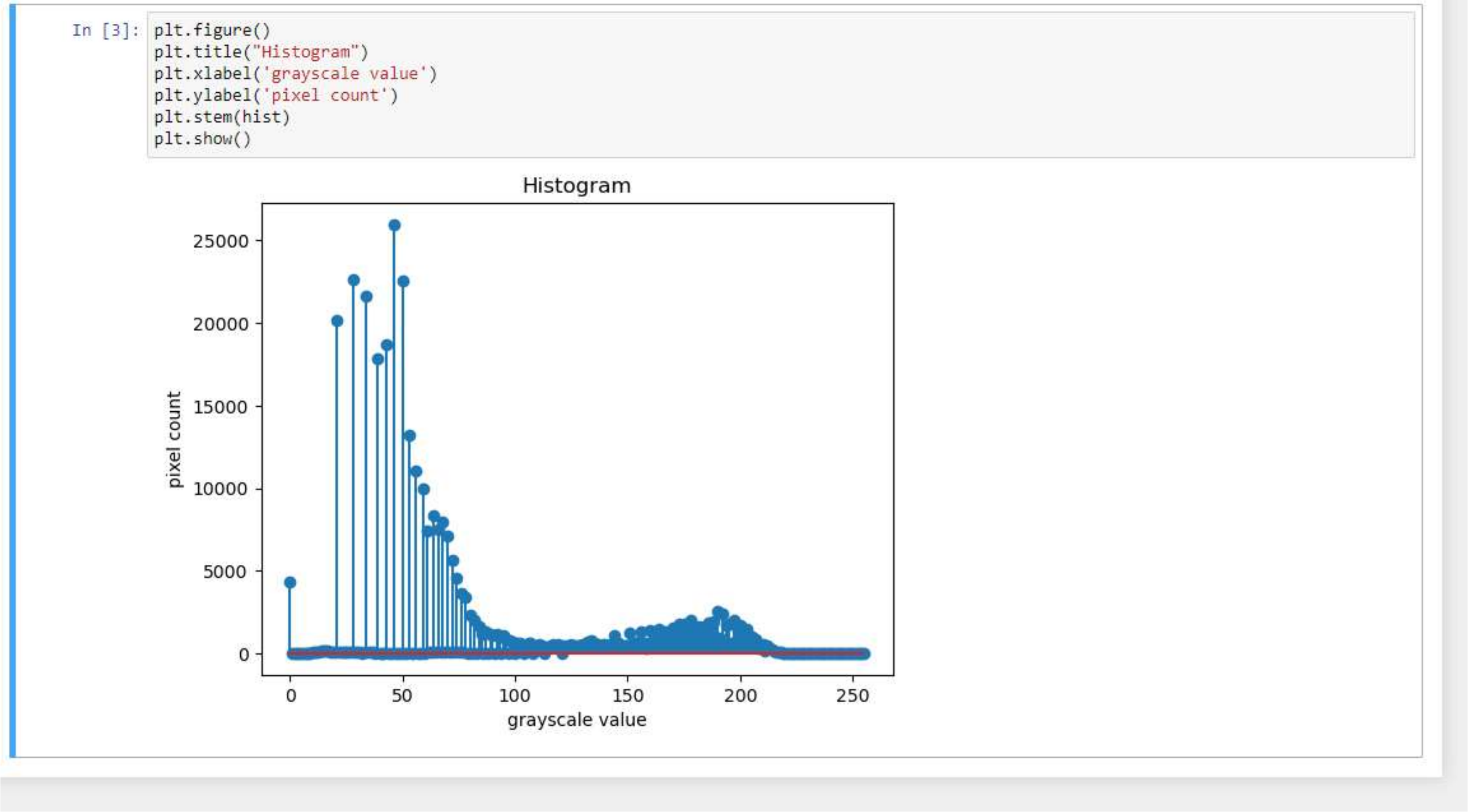
GRAY IMAGE

Input Grayscale Image

```
In [*]: import cv2
        import matplotlib.pyplot as plt
        gray_image =cv2.imread('MESSI.PNG',0)
        cv2.imshow('gray_image',gray_image)
        cv2.waitKey(0)
        cv2.destroyAllWindows()
```

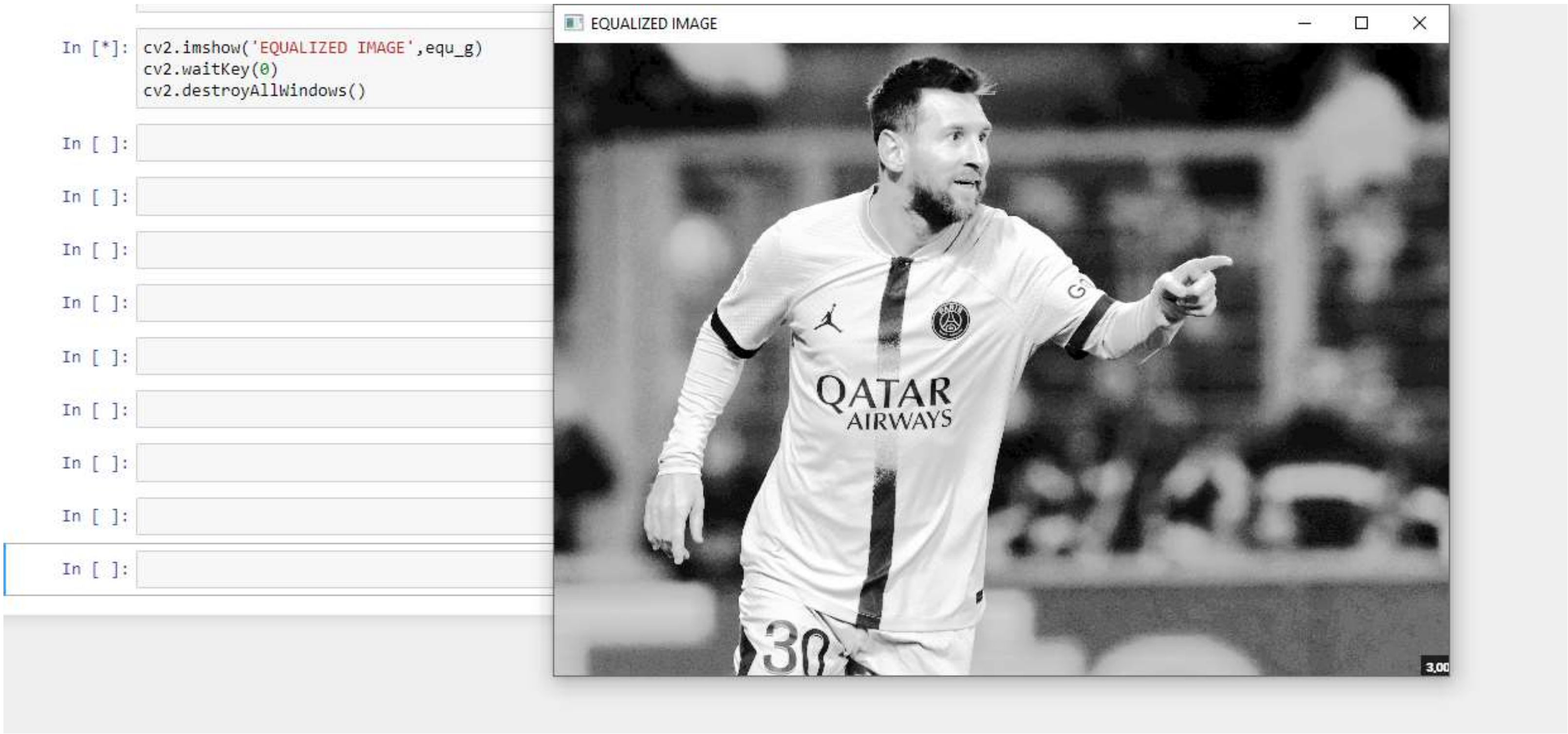


Histogram of Grayscale Image



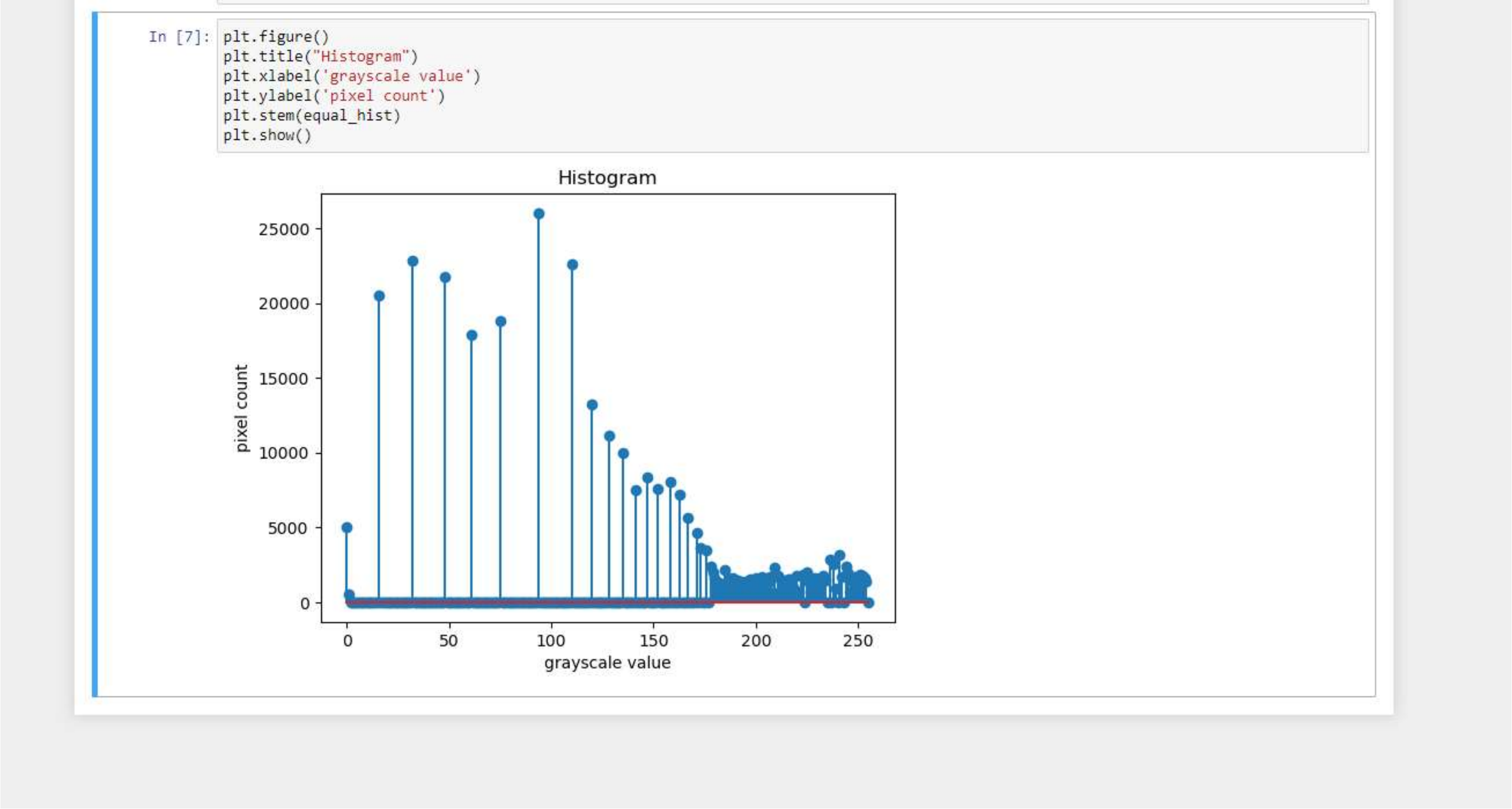
```
In [3]: plt.figure()
        plt.title("Histogram")
        plt.xlabel('grayscale value')
        plt.ylabel('pixel count')
        plt.stem(hist)
        plt.show()
```

Histogram Equalized Grayscale Image



```
In [*]: cv2.imshow('EQUALIZED IMAGE',equ_g)
        cv2.waitKey(0)
        cv2.destroyAllWindows()
```

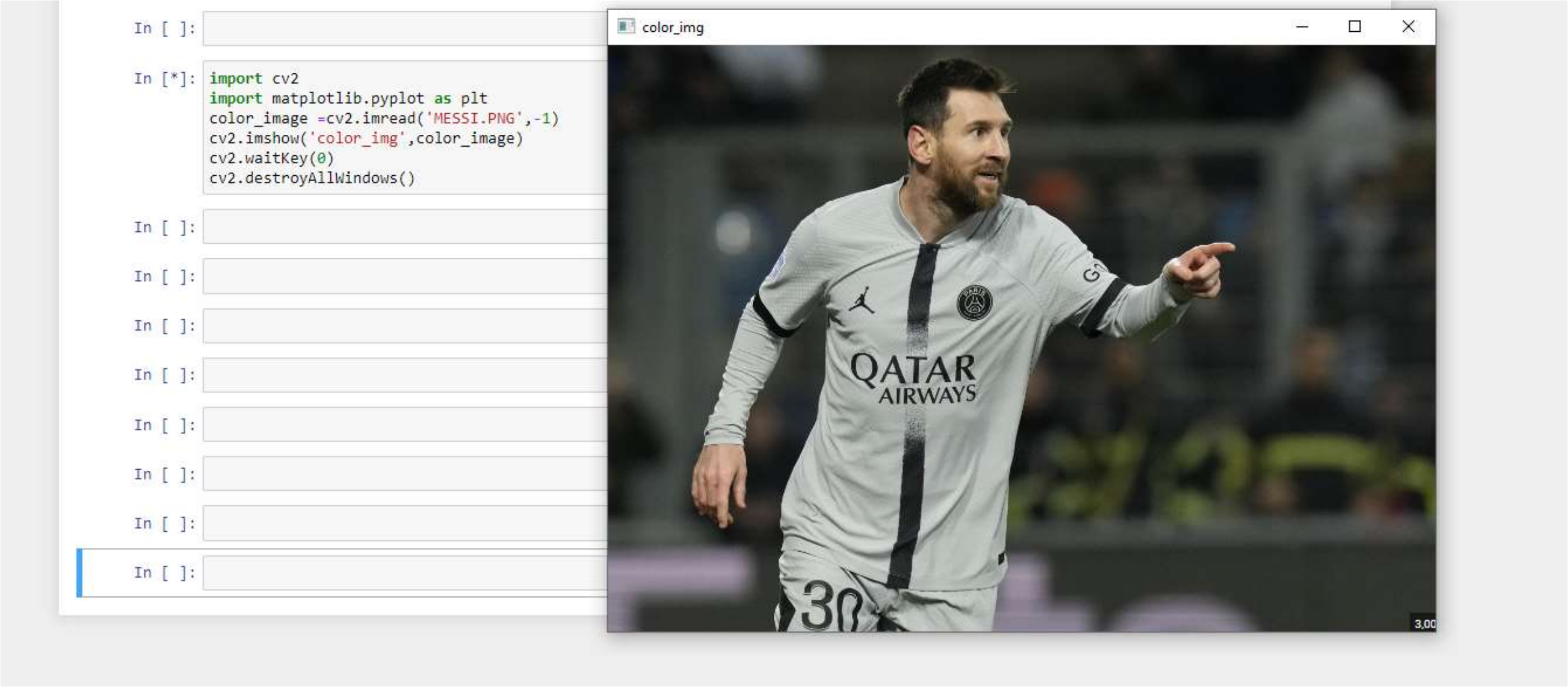
Equalized histogram of Grayscale Image



```
In [7]: plt.figure()
        plt.title("Histogram")
        plt.xlabel('grayscale value')
        plt.ylabel('pixel count')
        plt.stem(equal_hist)
        plt.show()
```

COLORIMAGE

Input color Image



```
In [ ]:

In [*]: import cv2
        import matplotlib.pyplot as plt
        color_image =cv2.imread('MESSI.PNG',-1)
        cv2.imshow('color_img',color_image)
        cv2.waitKey(0)
        cv2.destroyAllWindows()

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```
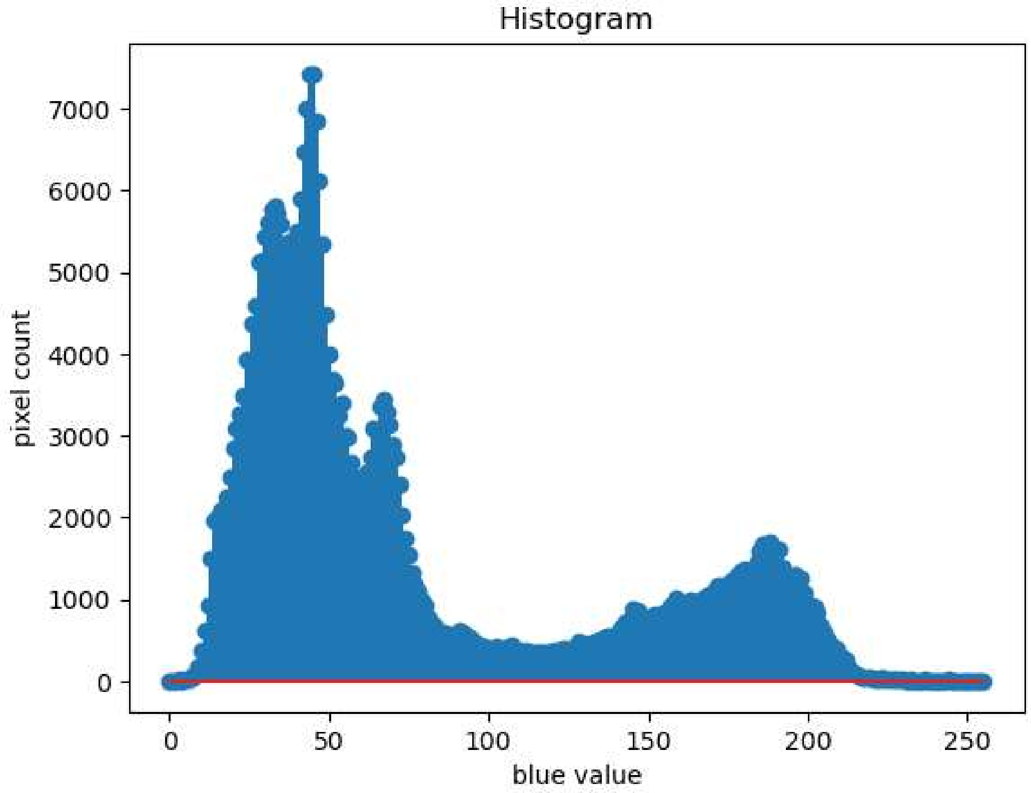
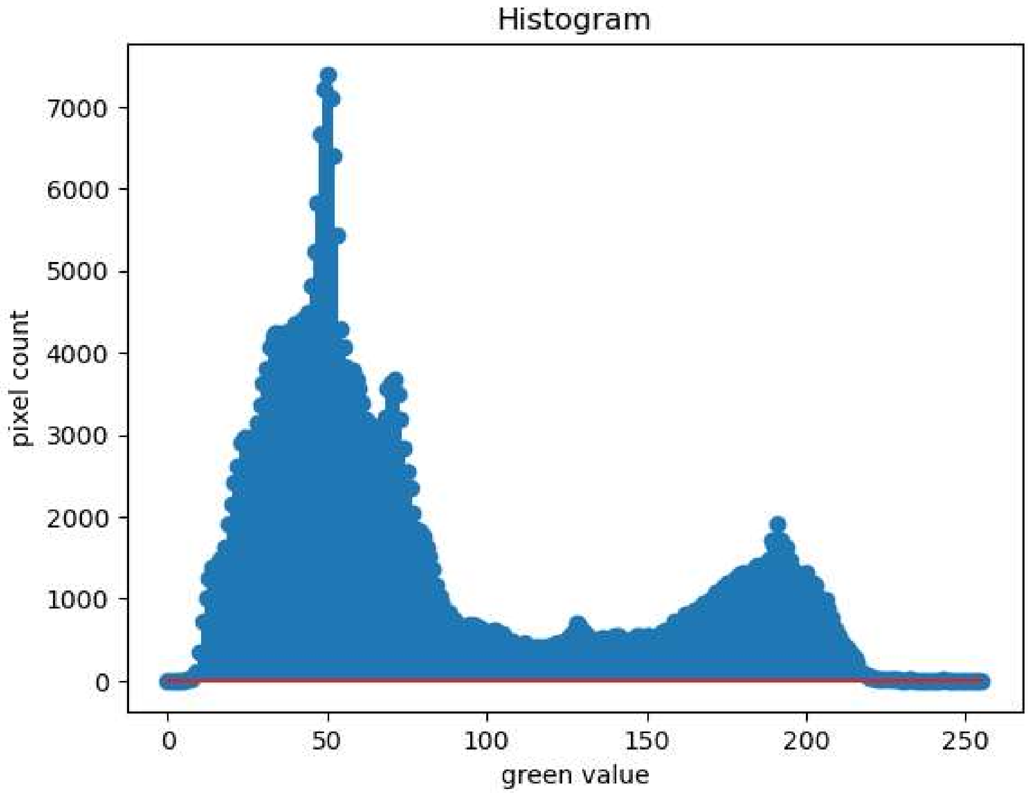
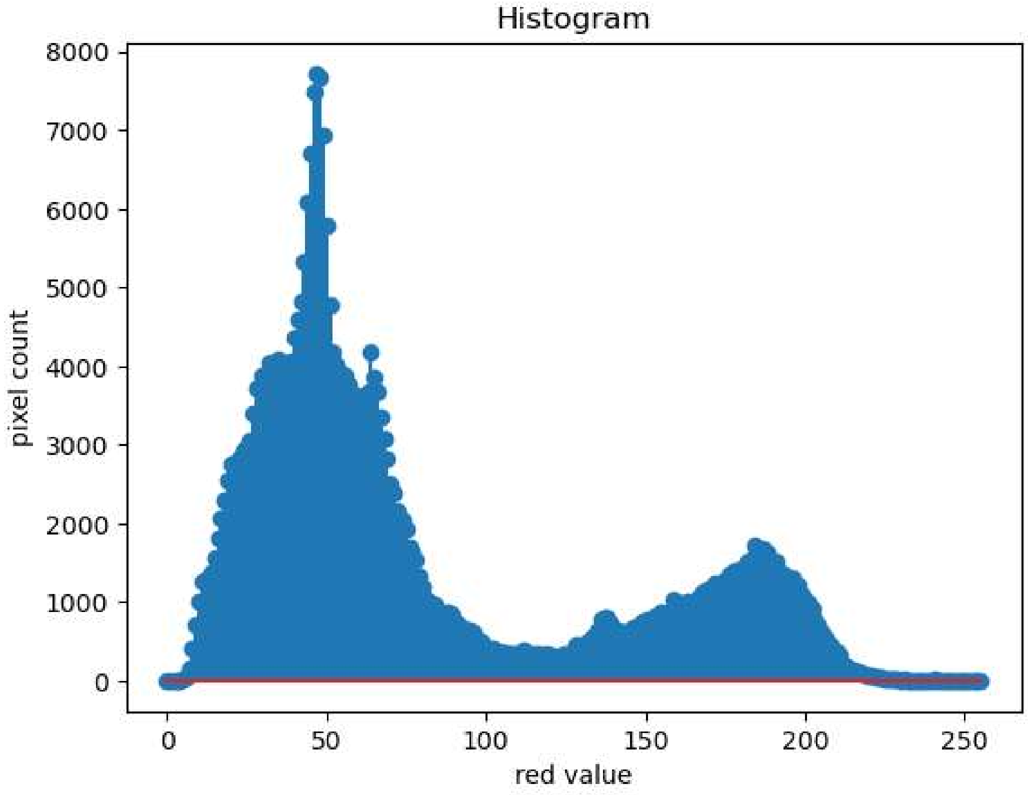

Histogram of different channels of color image







Result:

Thus the histogram for finding the frequency of pixels in an image with pixel values ranging from 0 to 255 is obtained. Also,histogram equalization is done for the gray scale image using OpenCV.