Experiment 2: Histogram equalization

Aim:- To perform histogram equalization of an Image.
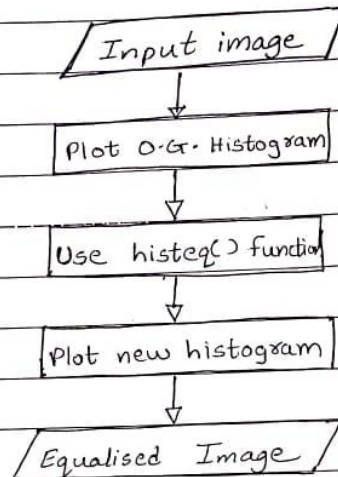
Apparatus: PC/Laptop, MATLAB software and few Images-

Theory: Histogram equalization is a method which is usually used to increases the global contrast of many images, especially when the usable data of the image is represented by close contrast values. Through this adjustment, the intensities can be better distributed on the histogram - It accomplishes this by effectively spreading out the most frequent intensity values. It often produes unrealistic effects in photographs. However, it is very useful for scientific images like thermal, satellite or x-ray images, often the same class of images to which one would apply false-colour.

Histogram equalization will work the best when applied to images which much higher colour depth than palatte size, like continuous data or 16-bit grayscale images. Generally, the histogram varies from 0 to 255. The left side of the graph is black and gradually varies till it becomes completely white. The y axis of the graph shows how many pixels of a particular intensity are present in the image

Name: Vighmesh Vikas Salgaonkar

Div/Roll no: B-21

Algorithm & Flowchart:

```
        ┌──────────────────┐
        │   Input image    /
        └──────────────────┘
                 │
                 ▼
        ┌──────────────────────┐
        │ Plot O·G· Histogram  │
        └──────────────────────┘
                 │
                 ▼
        ┌──────────────────────┐
        │ Use histeq() function│
        └──────────────────────┘
                 │
                 ▼
        ┌──────────────────────┐
        │ Plot new histogram   │
        └──────────────────────┘
                 │
                 ▼
        ┌──────────────────────┐
        /  Equalised  Image    /
        └──────────────────────┘
```

Each time when we need to input an image in MATLAB we store it within a variable. To read the image we use imread() function. To plot the histogram of the image we use imhist() function. Further to perform histogram equalisation we use histeq() function; and save the array of the image in another variable. Further to plot this new array's histogram, we again use imhist() function. To display this all histograms and images, we can use subplot command which will require a grid of 2x2.

Operations:
- To perform histogram equalization of an image

Coding and Output:

```
1 -   clear all
2 -   close all
3 -   clc
4
5 -   Image1 = imread('ICMP1.jpg');
6 -   subplot(221)
7 -   imshow(Image1)
8 -   title('Original Image');
9
10 -  subplot(222)
11 -  imhist(Image1)
12 -  title('Original Image Histogram');
13
14 -  subplot(223)
15 -  Image2 = histeq(Image1);
16 -  imshow(Image2)
17 -  title('Processes Image');
18
19 -  subplot(224)
20 -  imhist(Image2)
21 -  title('Processed Image Histogram');
22
```
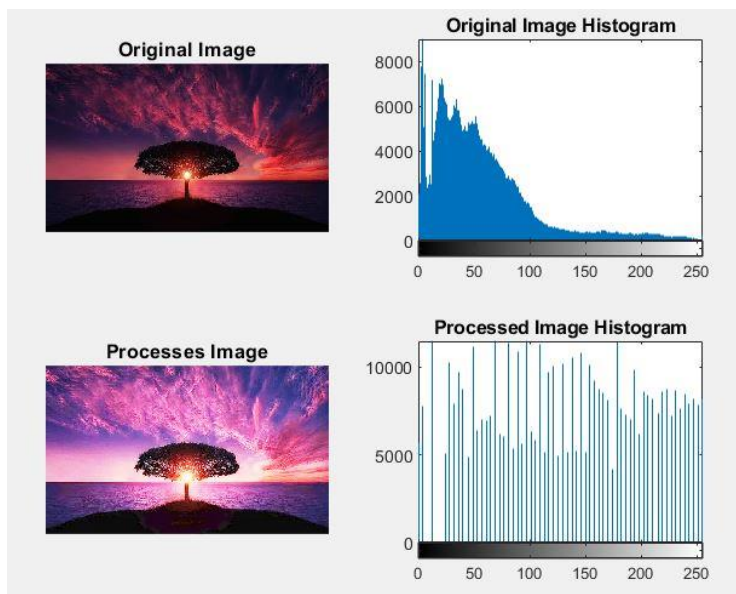

Conclusion: Thus, I conclude that I have studied, understood and implemented the concept of histogram equalization with the help of MATLAB