SRM Institute of Science and Technology College of Engineering and Technology

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MINI PROJECT REPORT

ODD Semester, 2021-22

Sub. code & Title : **18ECC204J – DIGITAL SIGNAL PROCESSING**

Year & Semester : 3rd, 5th

Mini Project Title : **IMAGE ENHANCEMENT BY HISTOGRAM MANIPULATION**

Name of the Lab In charge **: Dr. Vivek Maik**

Team Members with Reg. Numbers:

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Novelty in the Mini project work (2 marks)			
Level of understanding (4 marks)			
Contribution to the project (2 Marks)			
Report writing (2 Marks)			
Total (10 Marks)			

Date: **Signature of Lab In charge**

IMAGE ENHANCEMENT BY HISTOGRAM MANIPULATION

OBJECTIVE:

The Image enhancer is developed by manipulating the Histogram using Scilab . Histogram is a useful tool to analyze the brightness and contrast of an image. It shows how the intensity values of an image is distributed and the range of brightness from dark to bright.

ABSTRACT:

The image enhancer is made to enhance the images to make it look more appealing to human eyes. By using Histogram manipulation we change the intensity of the image to make it look brighter and better.

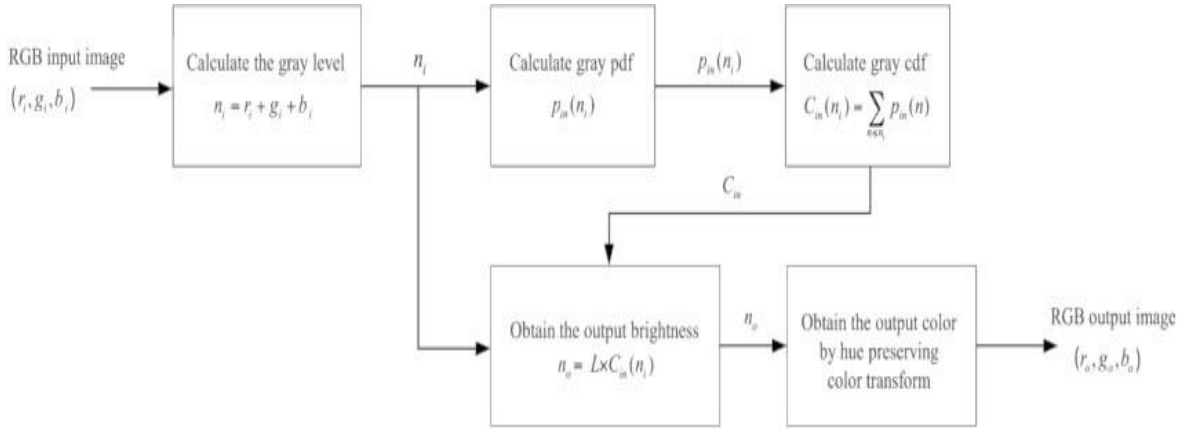
INTRODUCTION:

Image enhancement is the process of adjusting digital images so that the results are more suitable for display or further image analysis. For example, you can remove noise, sharpen, or brighten an image, making it easier to identify key features. Some useful examples and methods of image enhancement are: Filtering with morphological operators, Histogram equalization, Noise removal using a Wiener filter, Linear contrast adjustment, Median filtering, Unsharp mask filtering, Contrast-limited adaptive histogram equalization (CLAHE) and Decorrelation stretch.

HARDWARE/SOFTWARE REQUIREMENTS:

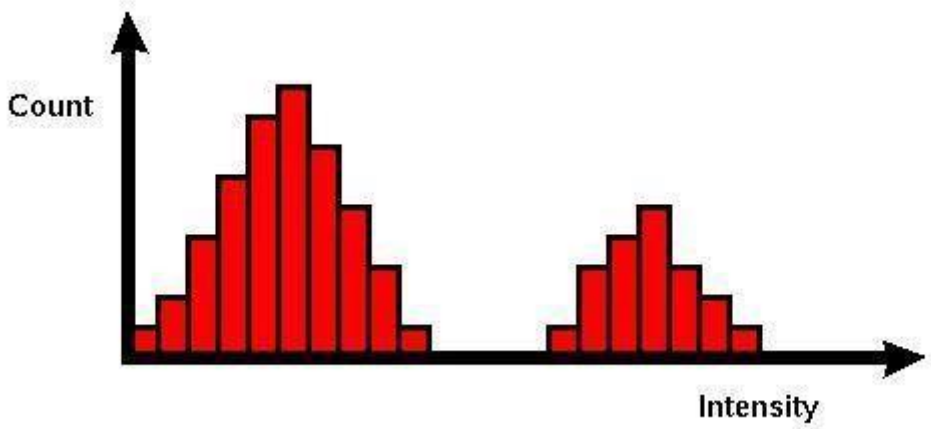
SCILAB , Image Processing and Computer Vision Toolbox for Scilab.

BLOCK Diagram

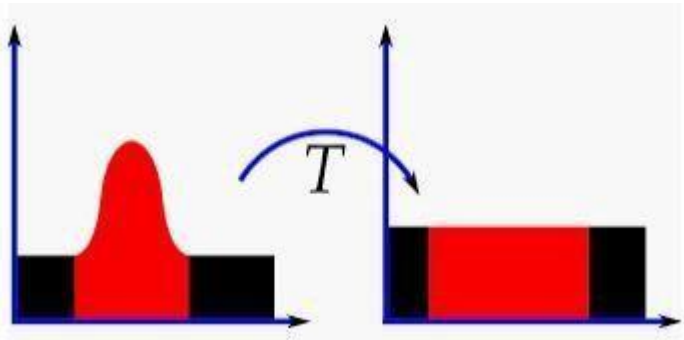


CONCEPTS/WORKING PRINCIPLE

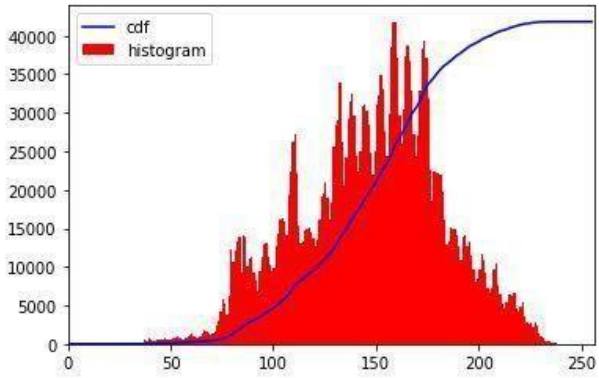
A histogram of an image is the graphical interpretation of the image's pixel intensity values. It can be interpreted as the data structure that stores the frequencies of all the pixel intensity levels in the image.



Histogram Equalization is an image processing technique that adjusts the contrast of an image by using its histogram. To enhance the image's contrast, it spreads out the most frequent pixel intensity values or stretches out the intensity range of the image. By accomplishing this, histogram equalization allows the image's areas with lower contrast to gain a higher contrast.



Histogram Equalization can be used when you have images that look washed out because they do not have sufficient contrast. In such photographs, the light and dark areas blend together creating a flatter image that lacks highlights and shadows.



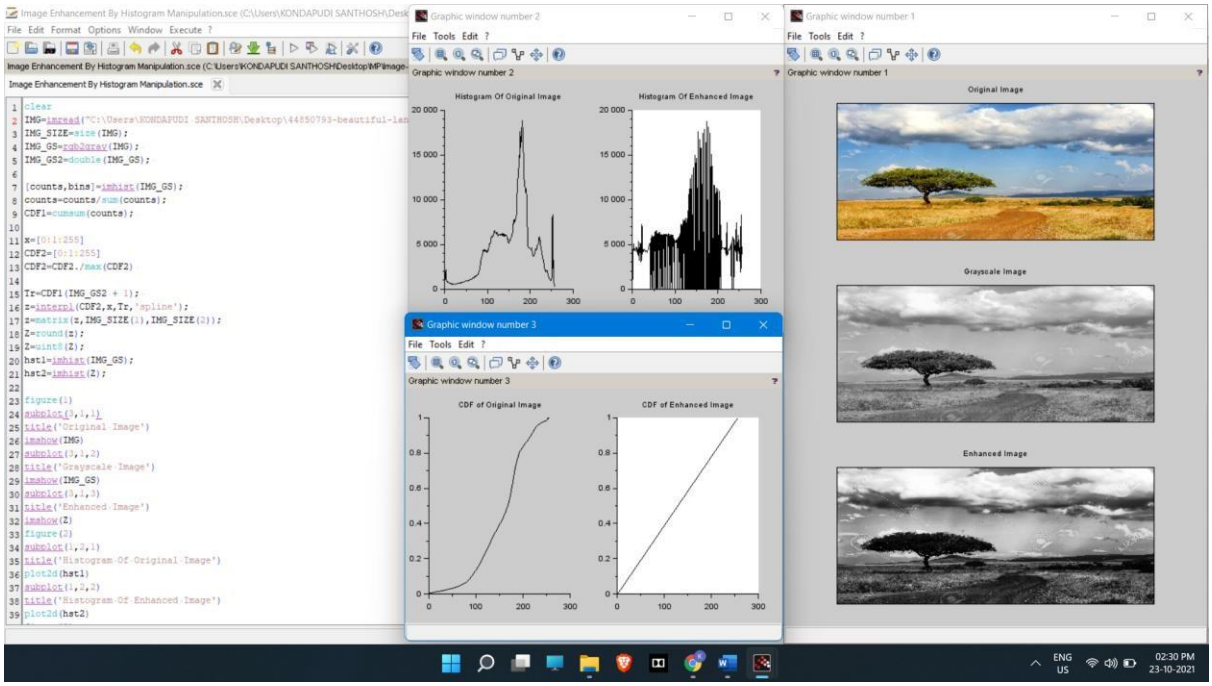
Unlike the original histogram, the pixel intensity values now range from 0 to 255 on the Xaxis. In a way, the original histogram has been stretched to the far ends. You may also notice that the cumulative distribution function (CDF) line is now linear as opposed to the original curved line.

APPROACH/METHODOLOGY/PROGRAMS:

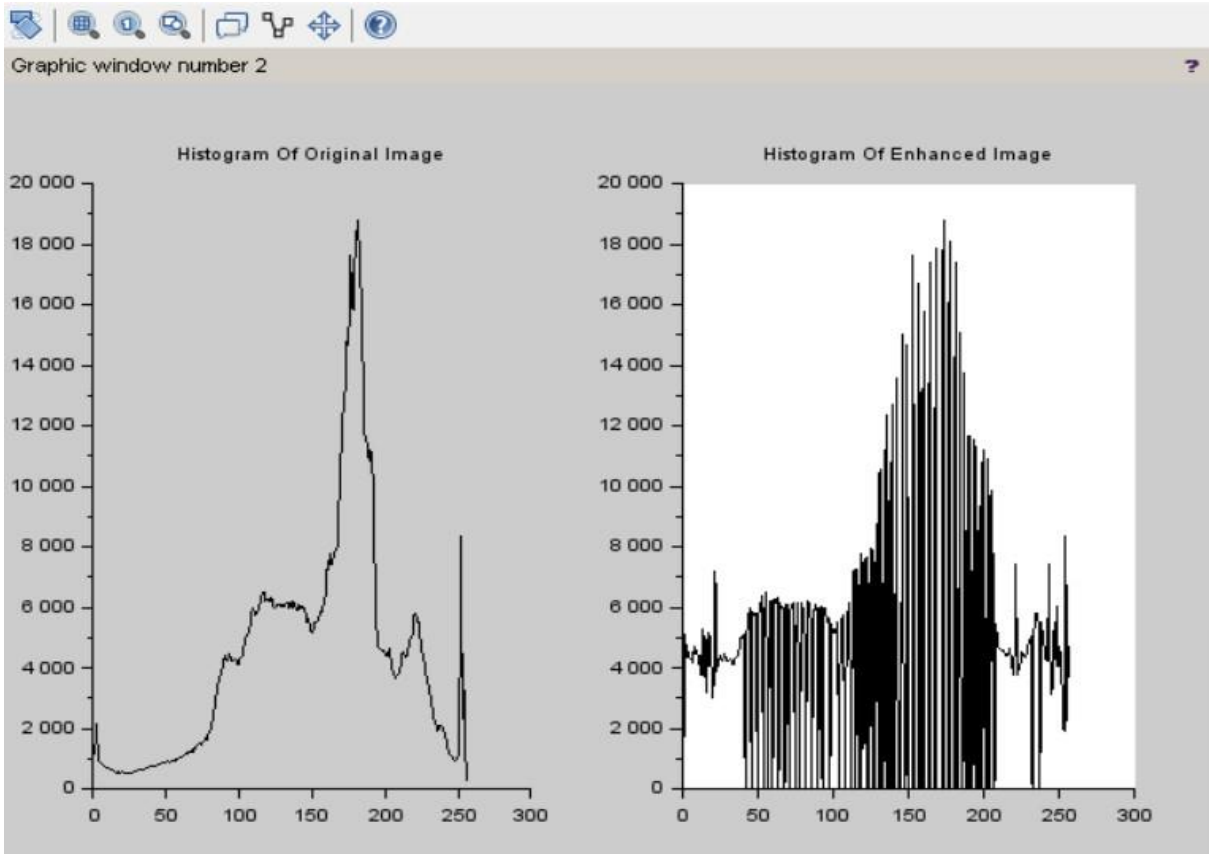
```
clear;
IMG=imread("clear-sky-bright-sun-rays-atmosphere-below-light-fluffy-clouds-155430369.jpg");
IMG_SIZE=size(IMG);
IMG_GS=rgb2gray(IMG);
IMG_GS2=double(IMG_GS);

[counts,bins]=imhist(IMG_GS); //get the histogram of an image
counts=counts/sum(counts);
CDF1=cumsum(counts);//cumulative sum of array elements
x=[0:1:255] CDF2=[0:1:255]
CDF2=CDF2./max(CDF2)

Tr=CDF1(IMG_GS2 + 1);//maps the pixel values
z=interp1(CDF2,x,Tr,'spline');  //one_dimension interpolation function
z=matrix(z,IMG_SIZE(1),IMG_SIZE(2));//reshape a vector or a matrix to a different size matrix Z=round(z);
Z=uint8(Z);  // Convert to 8-bit unsigned integer
hst1=imhist(IMG_GS);
hst2=imhist(Z);
```

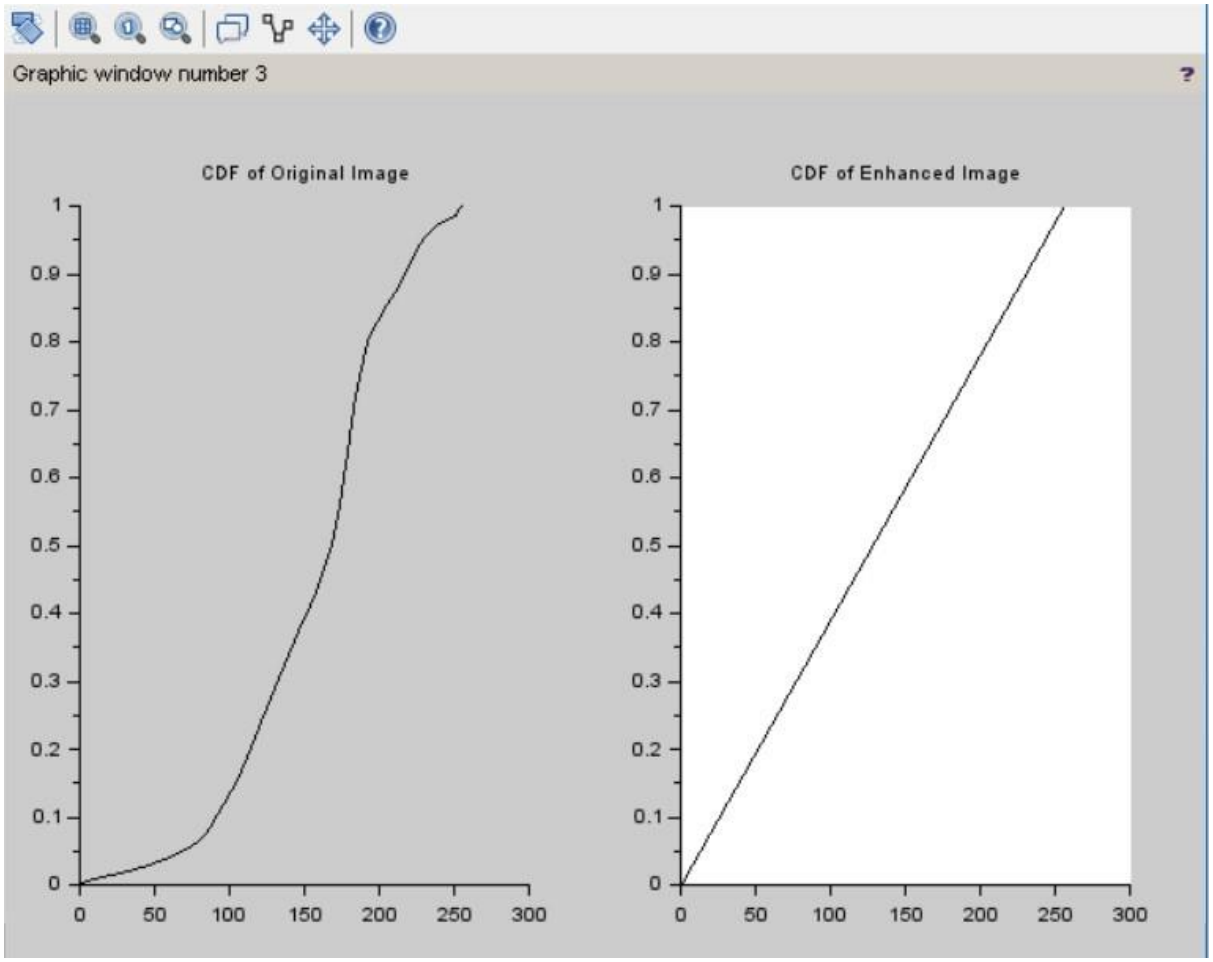
```
figure(1) subplot(3,1,1)
title('Original Image')
imshow(IMG)
subplot(3,1,2) title('Grayscale
Image') imshow(IMG_GS)
subplot(3,1,3)
title('Enhanced Image')
imshow(Z) figure(2)
subplot(1,2,1)
title('Histogram Of Original Image')
plot2d(hst1) subplot(1,2,2)
title('Histogram Of Enhanced Image')
plot2d(hst2) figure(3)
subplot(1,2,1)
title('CDF of Original Image')
plot2d(CDF1) subplot(1,2,2)
title('CDF of Enhanced Image')
plot2d(CDF2)
```

OUTPUT:




Graphic window number 1
File Tools Edit ?
Graphic window number 1
Original Image
Grayscale Image
Enhanced Image


Graphic window number 2
Histogram Of Original Image
Histogram Of Enhanced Image
20 000
18 000
16 000
14 000
12 000
10 000
8 000
6 000
4 000
2 000
0
0
50
100
150
200
250
300


Graphic window number 3
CDF of Original Image
CDF of Enhanced Image
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
50
100
150
200
250
300

CONCLUSIONS:

Thus the **Image Enhancement By Histogram Manipulation** is constructed and the image is enhanced by manipulating the histogram of the gray-scaled image.

REFERENCES:

https://medium.com/@kyawsawhtoon/a-tutorial-to-histogram-equalization-497600f270e2

https://www.researchgate.net/figure/Block-diagram-of-the-proposed-histogram-equalizationmethod-Cdf-of-gray-level-is_fig3_224169951

IMAGE ENHANCEMENT BY HISTOGRAM MANIPULATION

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