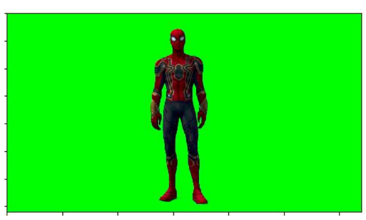
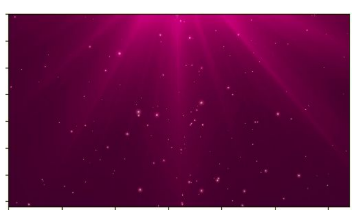
DIP ASSIGNMENT 1 - REPORT

1.
    a. To find the most dominant color in an image K-means algorithm is used. This returns a shade of green as the most dominant color for fg.jpg which is [9.46736437 237.04672092 22.7432487] in BGR format .
    b. mergeImage function goes through each pixel of fg.jpg and replace the most dominant color pixels with pixels from bg.jpg. This did not give good results at the borders so some amount of thresholding was done to replace not just one shade of green(in this case) but all the shades of green.
    c. For chroma-keying to work for different set of fg and bg images , the shades of most dominant color of the image is found and those pixels are replaced with pixels of bg





2.

a. The function linContrastStretching takes a grayscale image and stretches the range to [a,b] from [a_low,a_high] by applying the formula :new_im[i][j] = a + (im[i][j] - a_low)*(b - a)/(a_high - a_low)

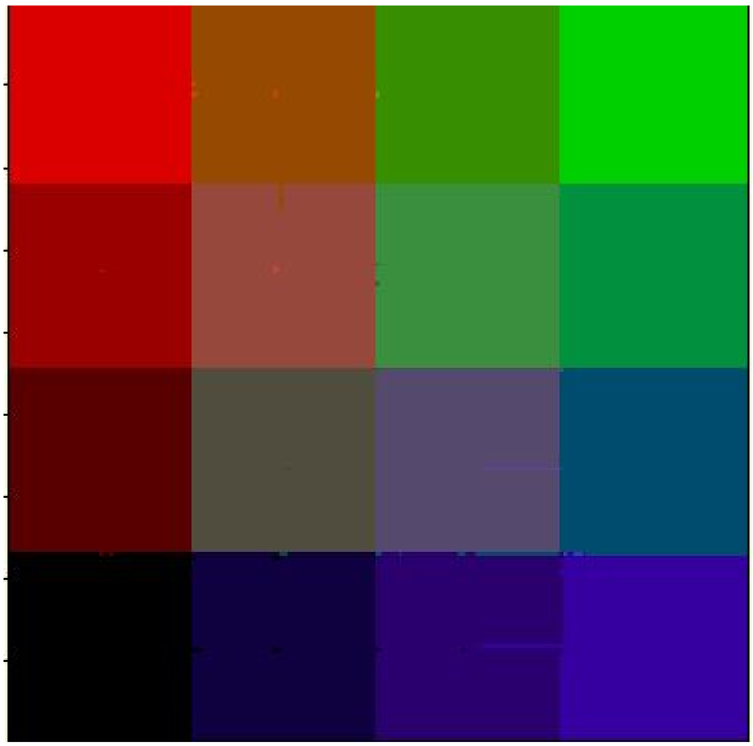
b. To get the k most frequently occurring colors we use k means algorithm, then this is displayed using color-bars near the respective image . We can see that in the colorbar ,the shift from darker shades of gray to lighter shades is less for the low contrast image , whereas for the high contrast image there is a high change in the shades.

c.

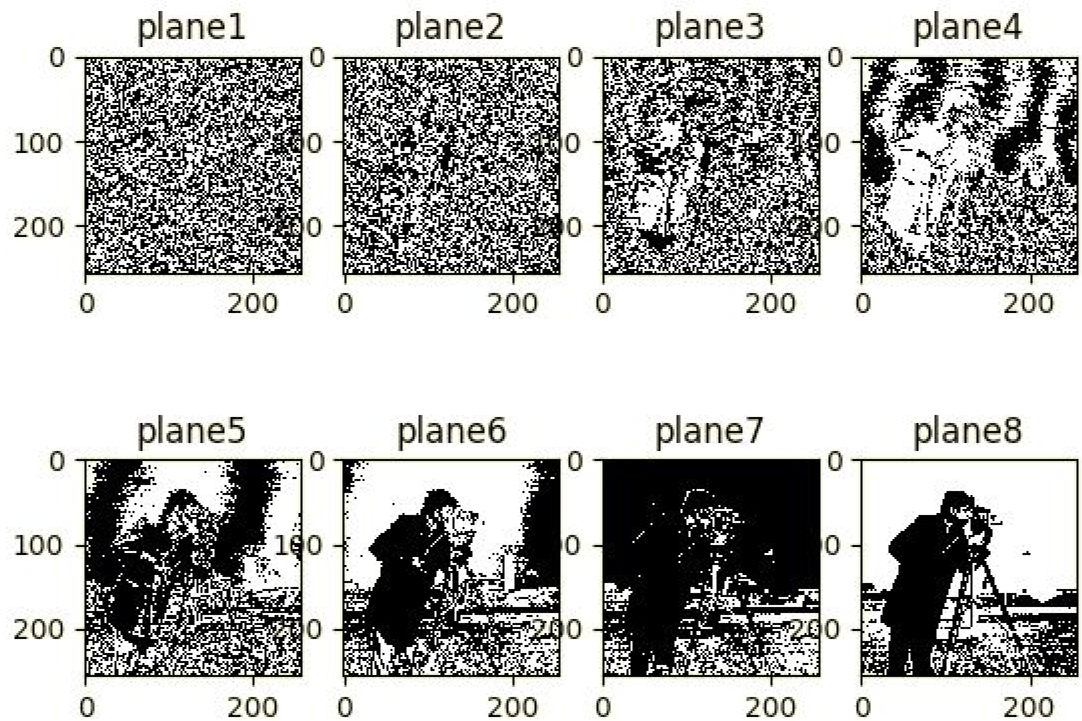
For different images ,the corresponding output will be different because for the low contrast image the shift from darker shades of gray to lighter shades is less , whereas for the high contrast image there is a high change in the shades. There will be a drastic change for the contrast stretched image compared to the original image.

3.

A. For k bit quantisation the image is right shifted by (8-k) and then left shifted by (8-k). Following is the result for k =2



B. To display different bit planes , the corresponding bit from each pixel of the image should be obtained from the respective position in the binary equivalent of the pixel intensity.

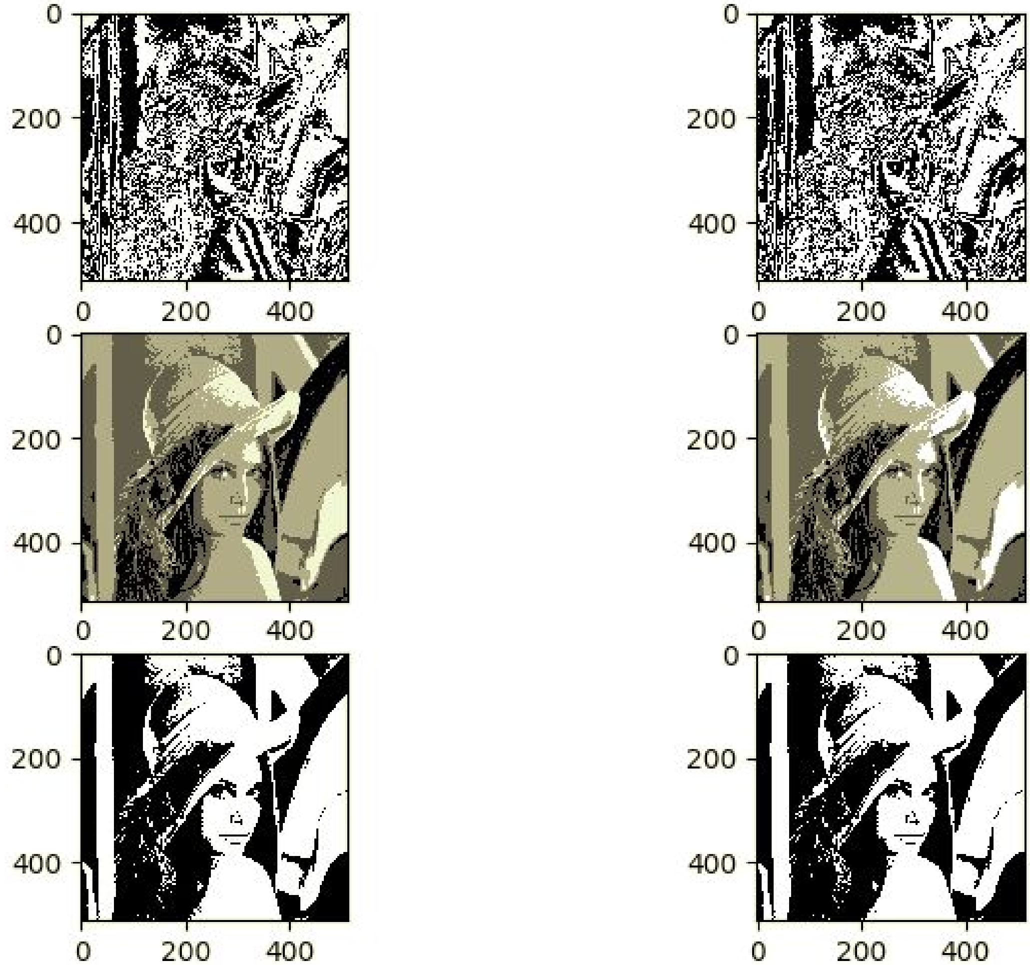


C. To obtain lena1 from lena , the fourth bitplane is sliced from lena.

To obtain lena2 from lena , lena is bit quantised to 2 bits.

To obtain lena2 from lena , lena is bit quantised to 1 bit.

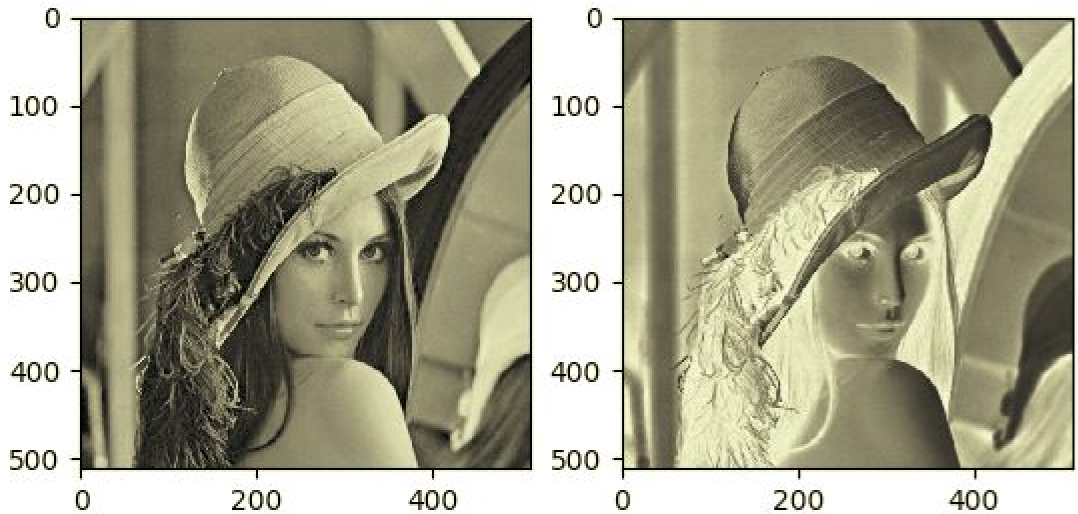
This image shows comparison on left and right side between given images of lena1,lena2 and lena3 and lenas obtained by performing the suitable operations



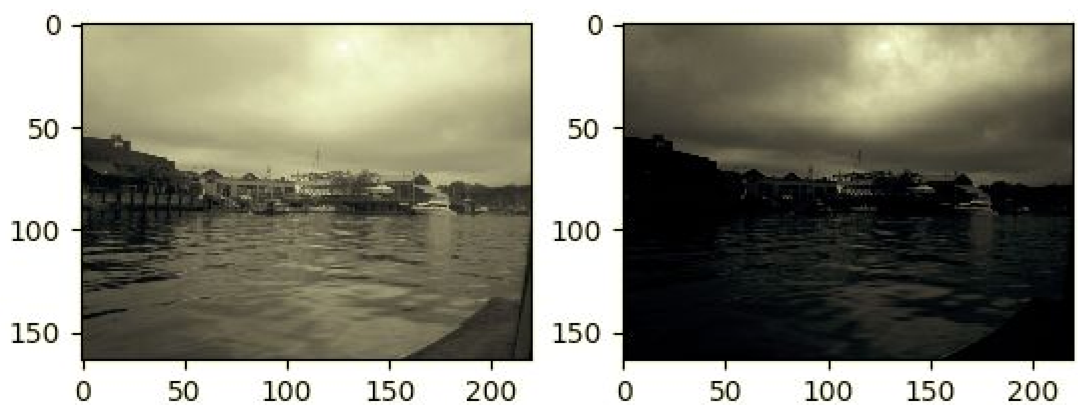
4.

A. First the 8k bit quantized forms of lena are created using generate_8kbit(im,k) function . Then the negative transform is taken by T(r) = (L - 1) - r, The max. intensity is found for each of the 8k quantised forms by max_intensity = (2**k) - 1, then corresponding negative transform is used.

One example of negative transform for 8k bit quantised image



B.For gamma transform , it is observed that the image becomes lighter and darker when gamma value is decreased and increased correspondingly



C. For piecewise transform , for the first graph 1 and the second graph 2 , the corresponding parameters k1,k2,a,b are as follows :

k1_1 = [0,4/3,-2,0]

k2_1 = [0,0,2,0]

a_1 = [0,0.3,0.6,0.8]

b_1 = [0.3,0.6,0.8,1]

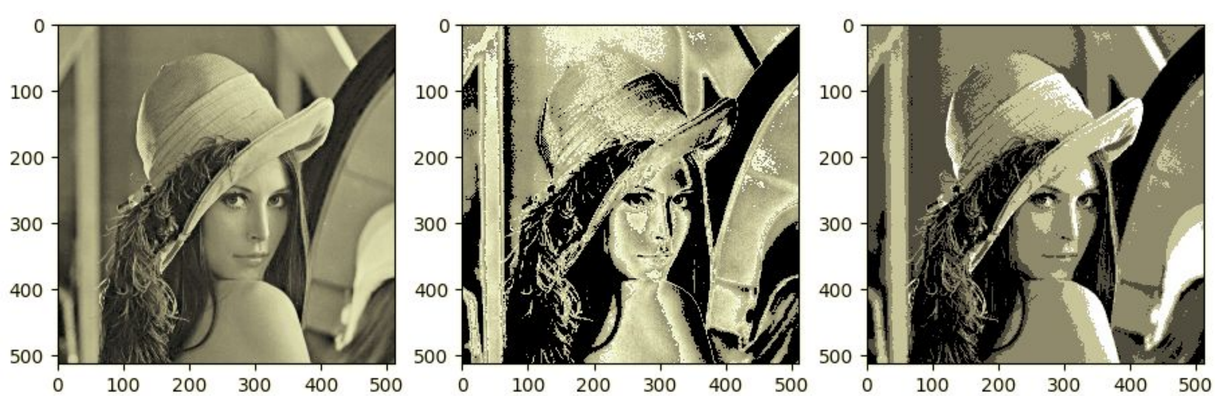
k1_2 = [0,0,0,0,0]

k2_2 = [0,0.2,0.4,0.6,0.8]

a_2 = [0,0.2,0.4,0.6,0.8]

b_2 = [0.2,0.4,0.6,0.8,1]

Applying the above parameters the resulting image is as follows with the first image corresponding to the original image ,the second image and the third one after applying transformation 1 and 2 respectively



5.

A. If the MSB bits in the bitplane is made as 0, then the resulting histogram will range from intensities 0 to L-1/2(L-1 is maximum intensity) . So the image will be darker
B. If the LSB bits in the bitplane is made as 0, then the resulting histogram will have zero values corresponding to odd values.The image will have only even grey levels so the image will be sharper.
C. Baud rate = no of bits transferred / second

No of bits in the image = 512 x 512 x 10(start + stop + info byte) = 2621440

a. Baud link = 56K

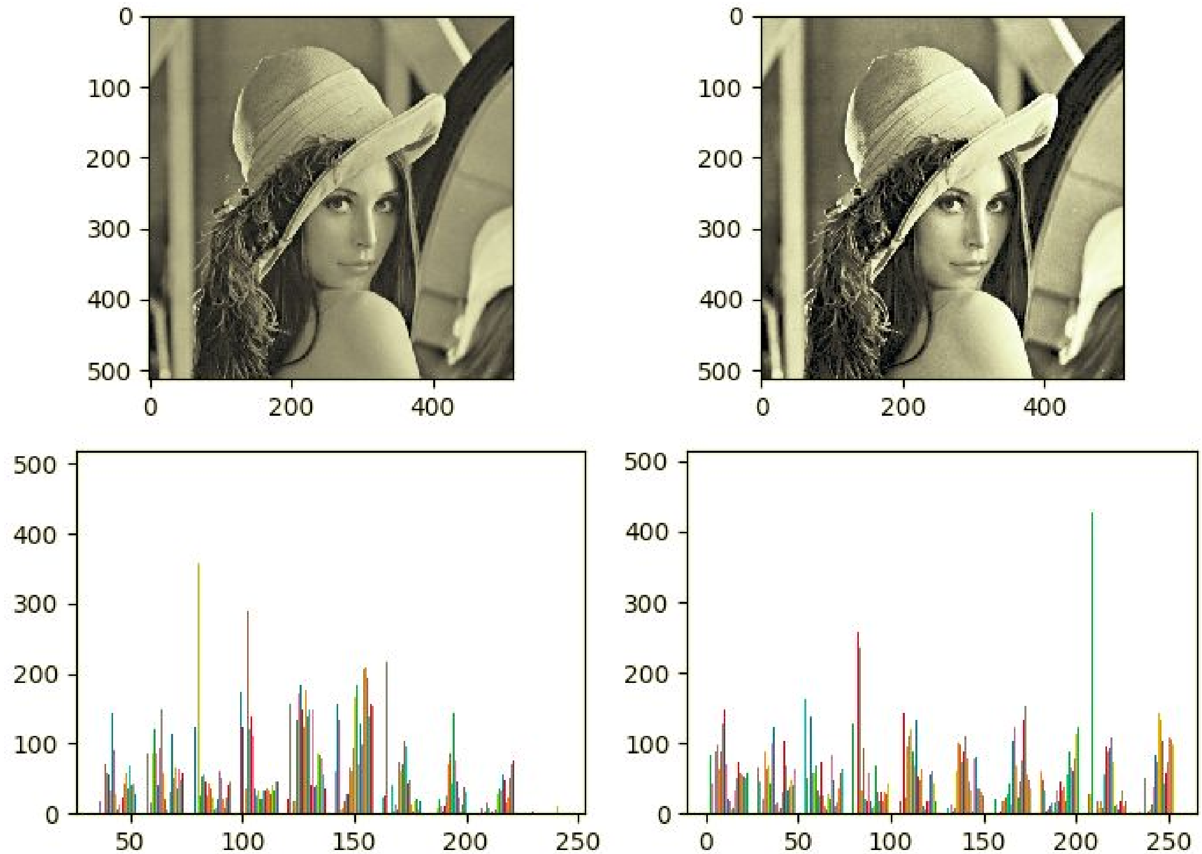
Time = no. of bits / baud link = 2621440/ 56K = 46.8secs

b. Baud link = 3000K

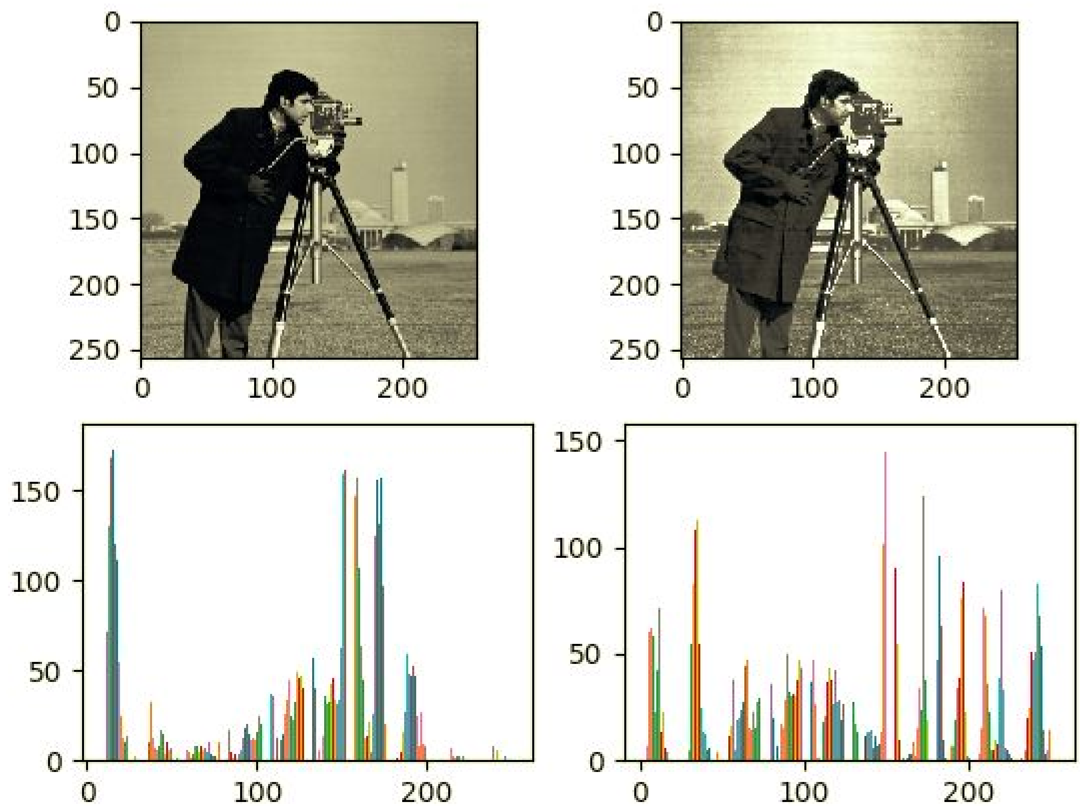
Time = no. of bits / baud link = 2621440/ 3000K = 0.873secs

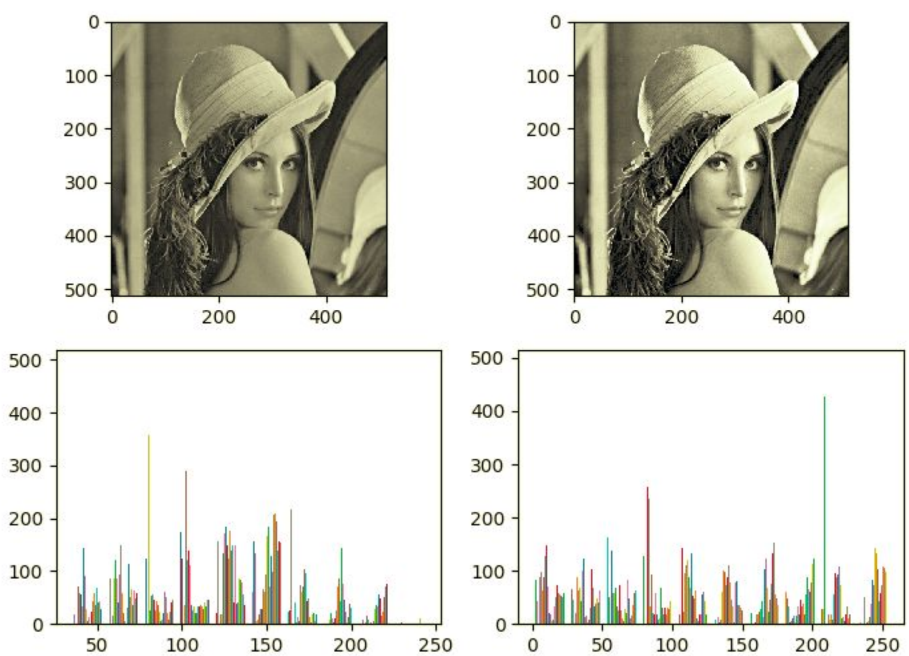
6.

A.When histogram equalisation is applied on the entire image this is result that we get

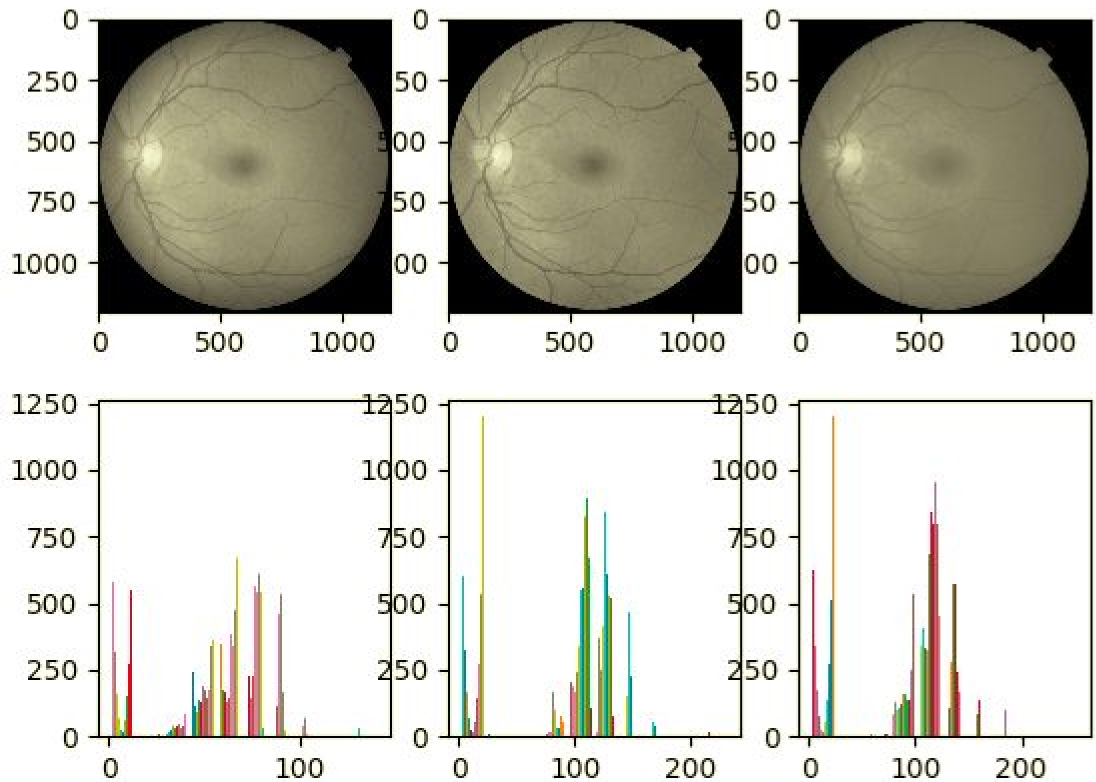


B. Histogram equalization is a technique for adjusting image intensities to enhance contrast. After histogram equalisation the image has more contrast and the intensities are more spread out in the histogram.





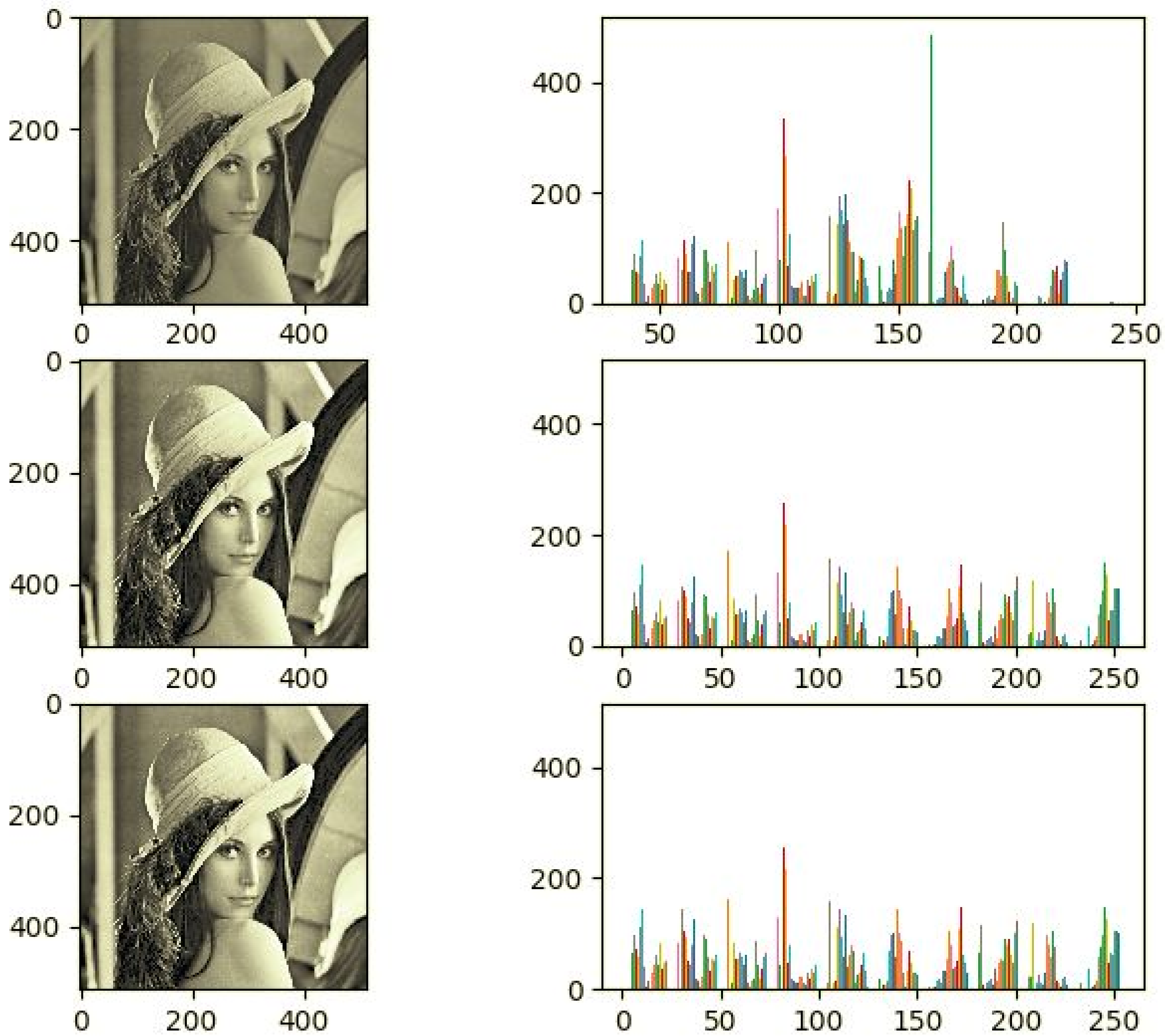
C. Results that we get on doing histogram matching taking eye as input image and eyeref as reference image to which its histogram should be matched



D. First, the original image canyon is split into 4 parts, then each part is taken as reference image for histogram matching with part 1,2,3 and 4 as the input image. The 4 output images that are generated after histogram matching with each part is taken and then joined together to form the final image.

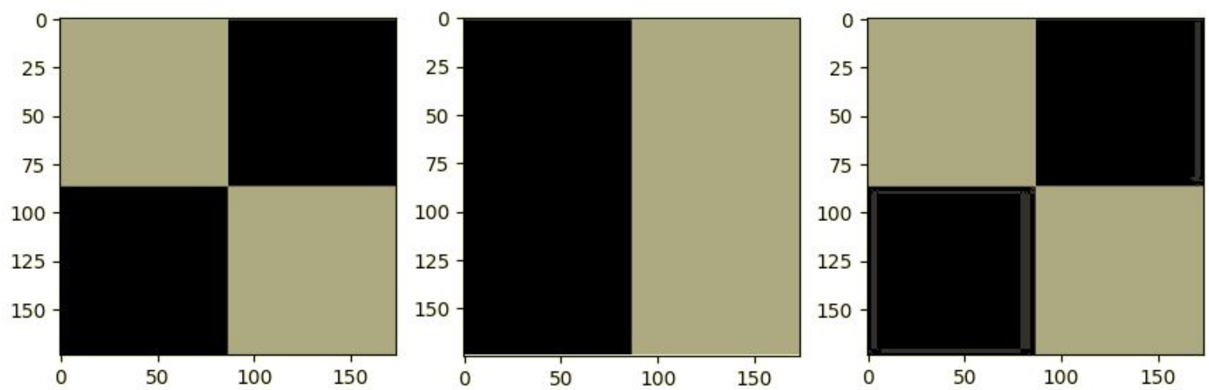
7.

a. First an image(img1) is taken and histogram equalisation is done on it to get (img2), then again histogram equalisation is performed on img2 to obtain img3. From the results, we can see that img2 = img3, this is because histogram equalisation is idempotent , so there will be no change. The value of histogram equalisation will not change when it is multiplied with itself. Histogram equalisation is a method to enhance the contrast of the input image by adjusting the intensities, but once this has been already done, performing the same operation won’t make any difference.

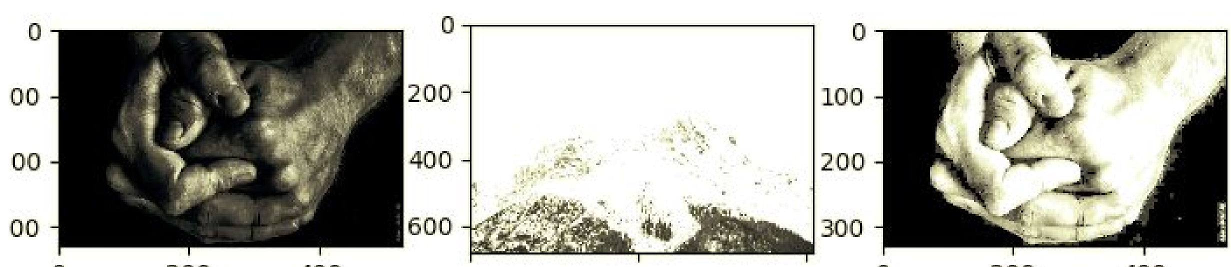


b.

i. On applying histogram matching (transformation) on two images with similar histogram , then the output image will be almost similar to the input image



ii. On applying histogram matching (transformation) on a dark input image with reference image as a light image, then the output image will have the content of the input image with the style(intensities) of the reference image.



iii. On applying histogram matching (transformation) on a dark input image with reference image as a light image, then the output image will have the content of the input image with the style(intensities) of the reference image.