

Name : Mohit Kumar

M.Tech AI Course Program (1st Semester)

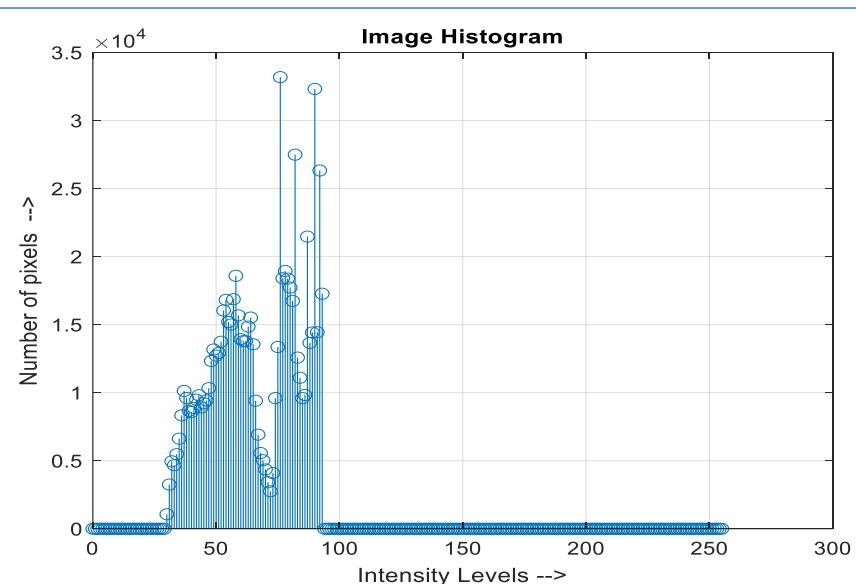
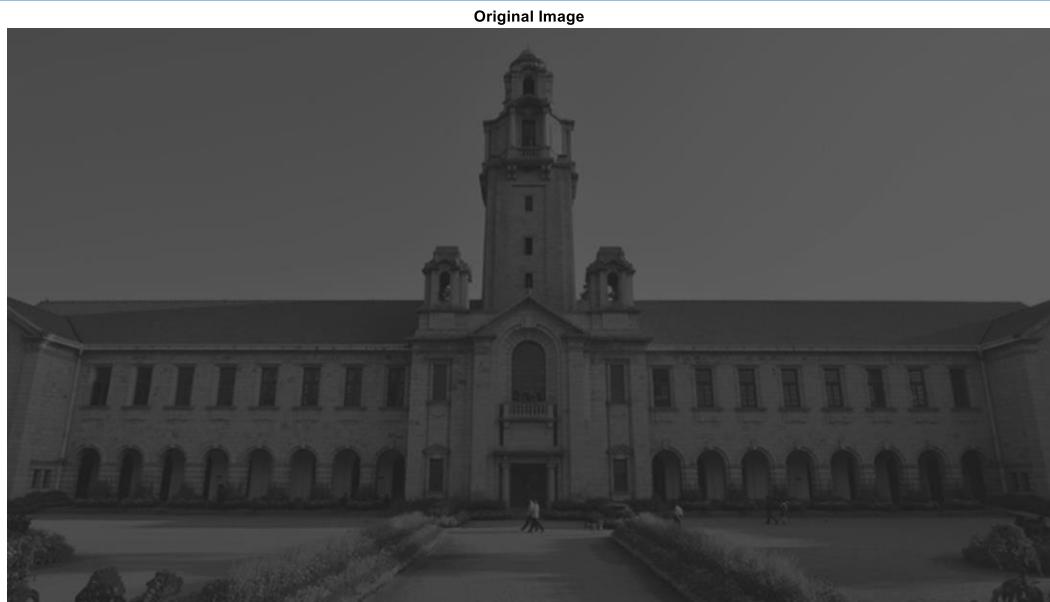
S.R No. : 04-01-03-10-51-21-1-19825

Assignment #02 : Digital Image Processing

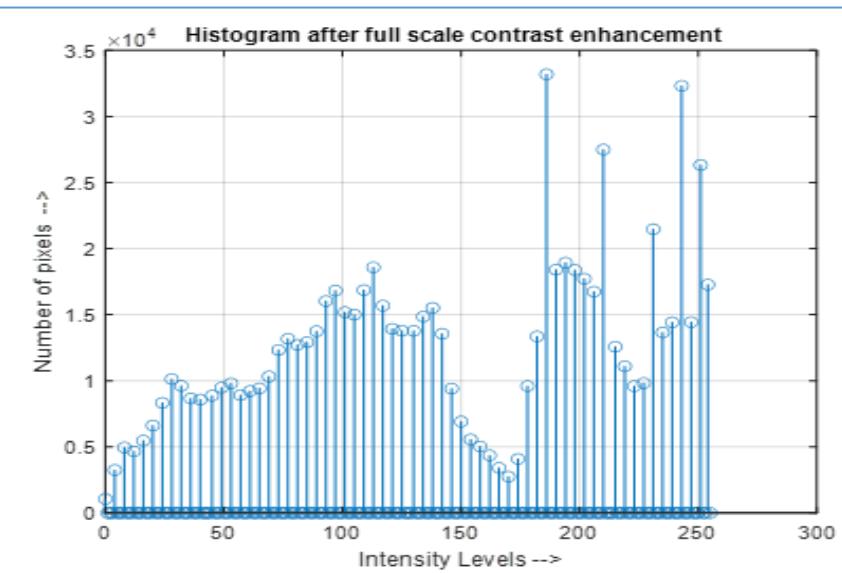
Date : September 13 , 2021

Question #01

Image : IIScMainBuilding_LowContrast.png



Full Scale Contrast Enhanced Image

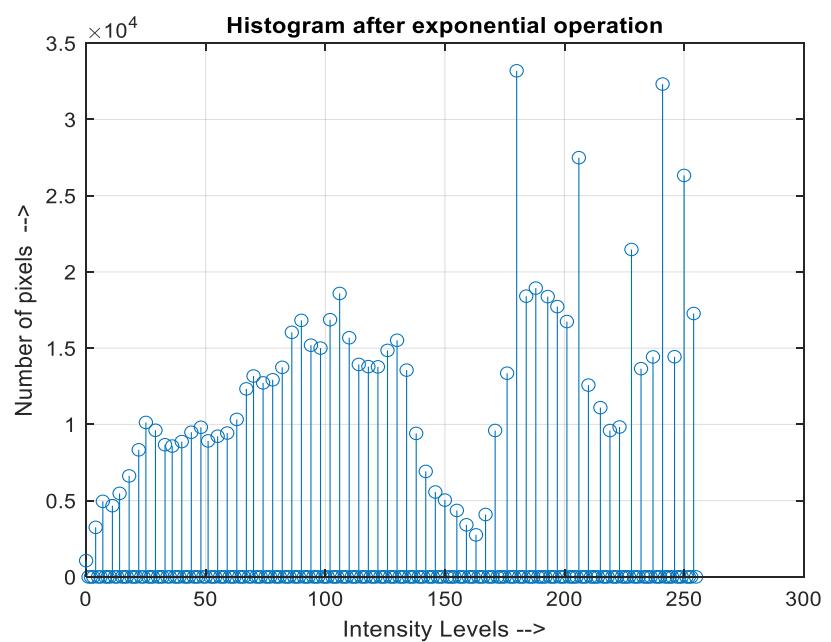


We see that full scale contrast enhancement works for this image as the image looks better than the original image visually.

Non Linear Exponential Operation



Histogram after exponential operation

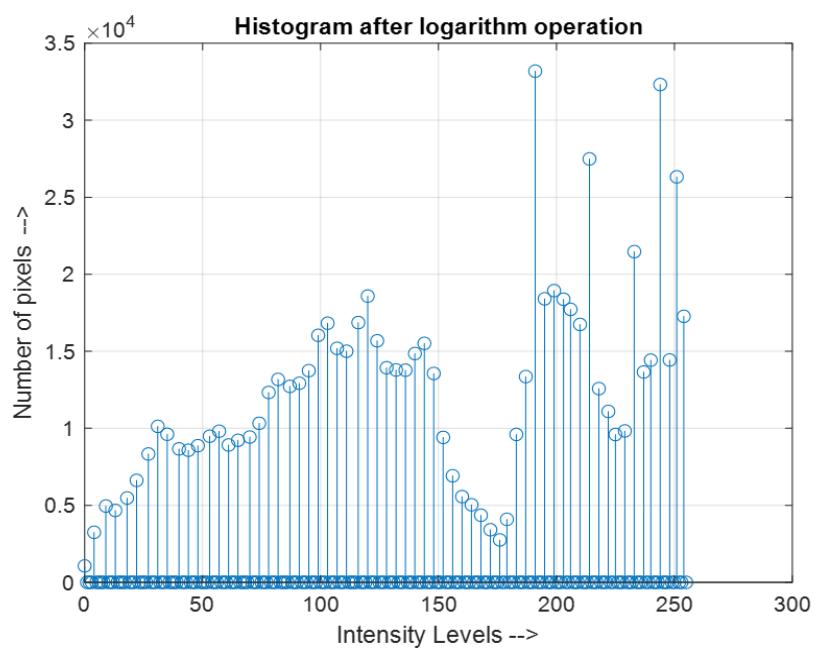


We see that exponential operation works for this image as the image looks better than the original image visually.

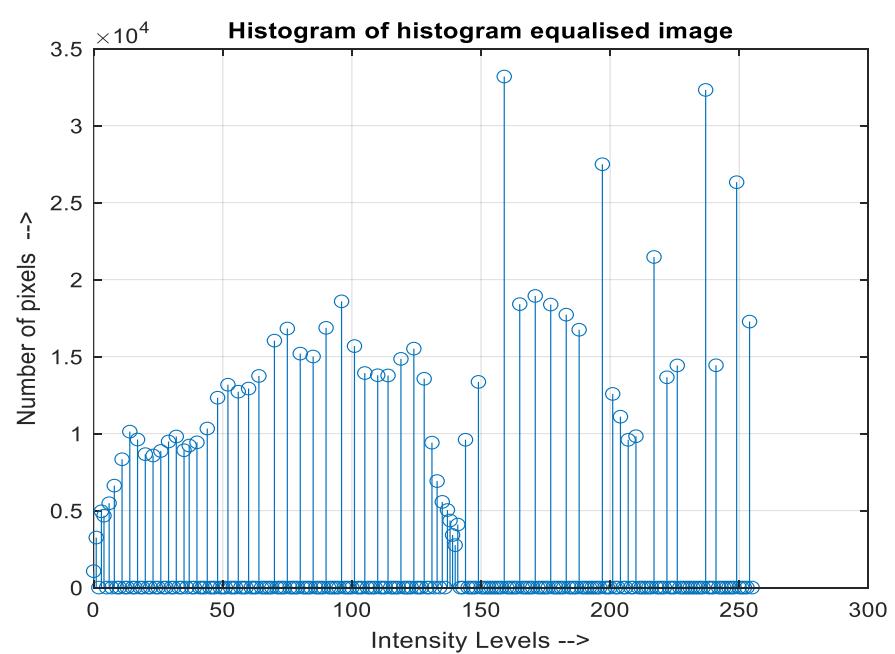
Non Linear Logarithm Operation



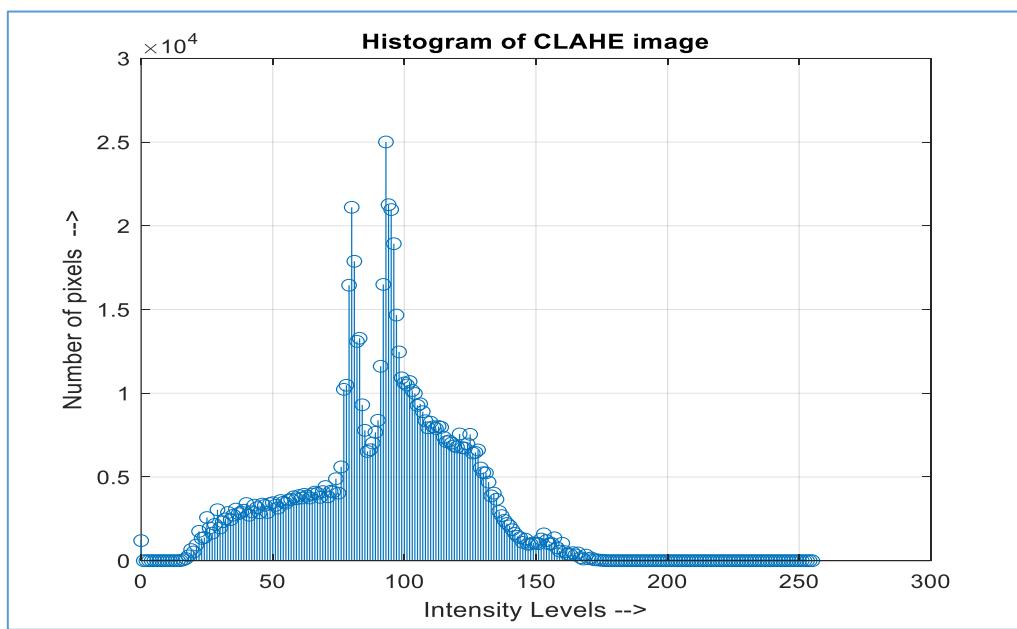
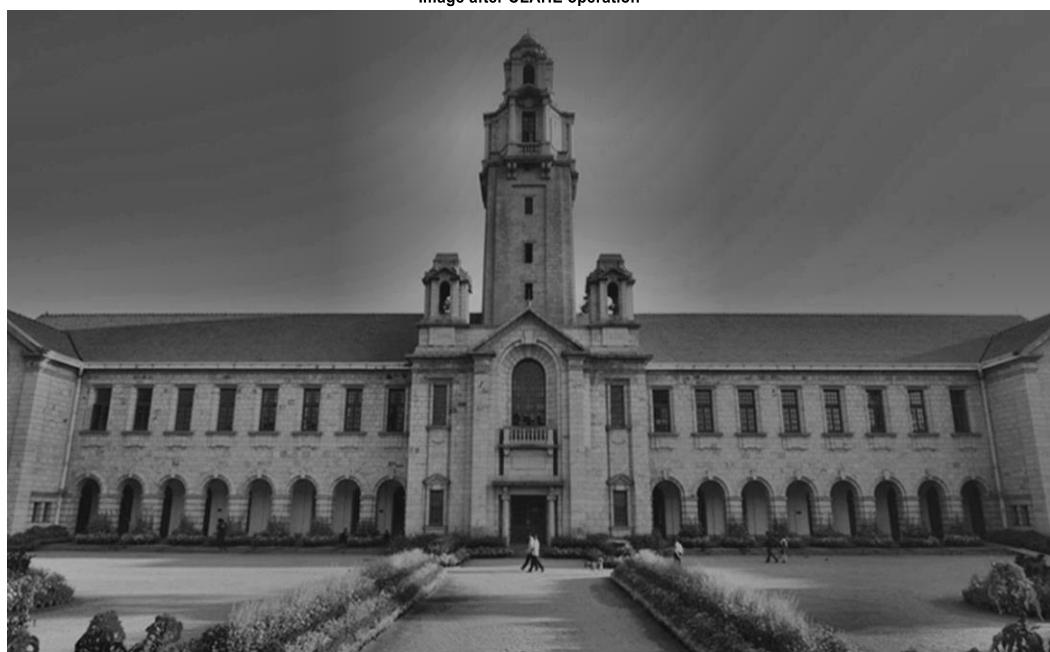
Histogram after logarithm operation



We see that logarithm operation works for this image as the image looks better than the original image visually.

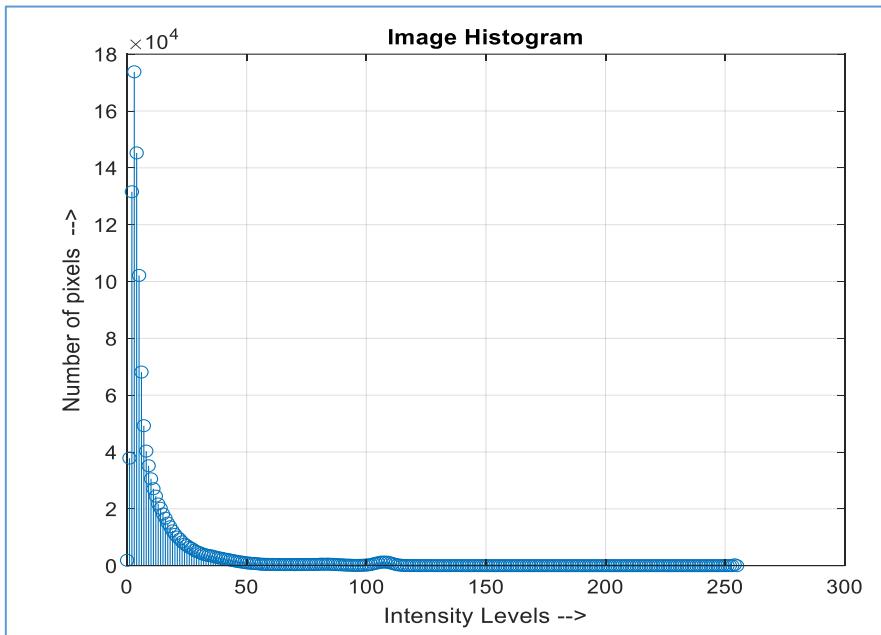
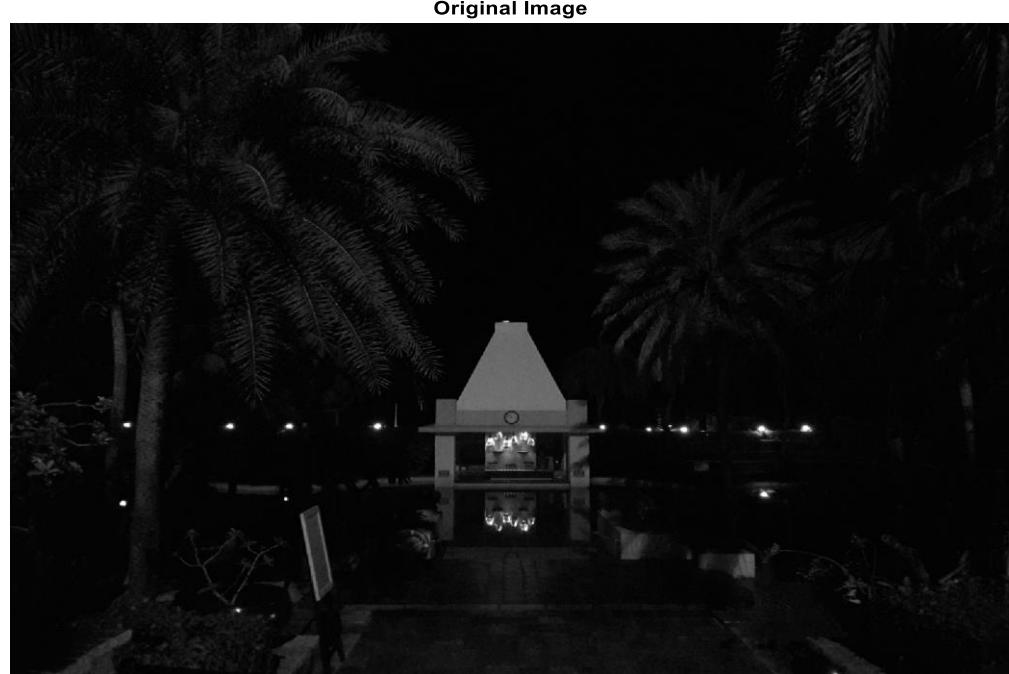


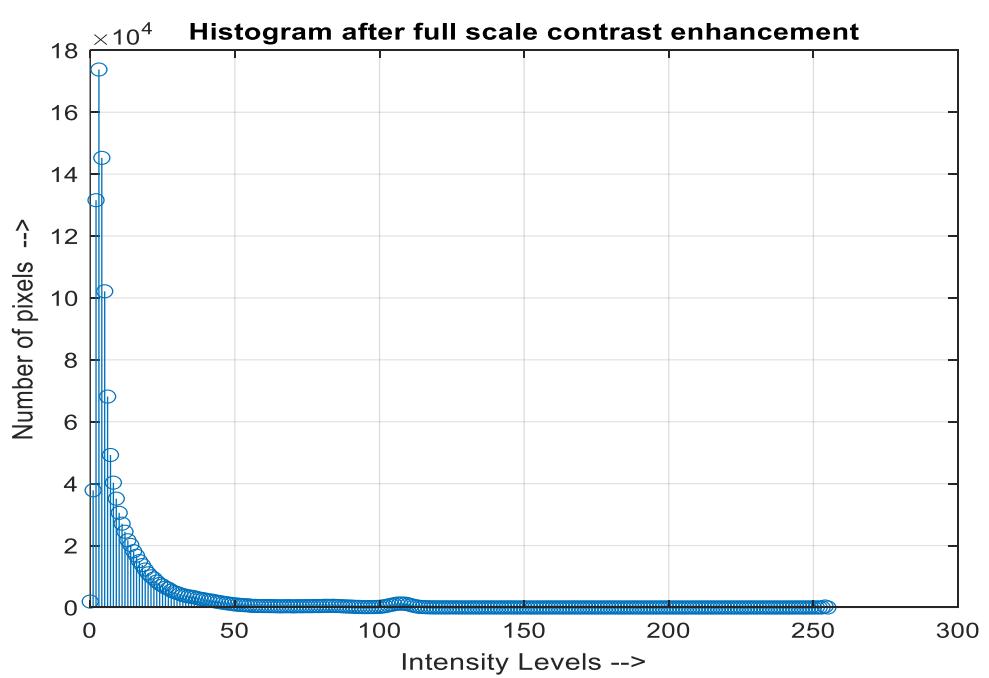
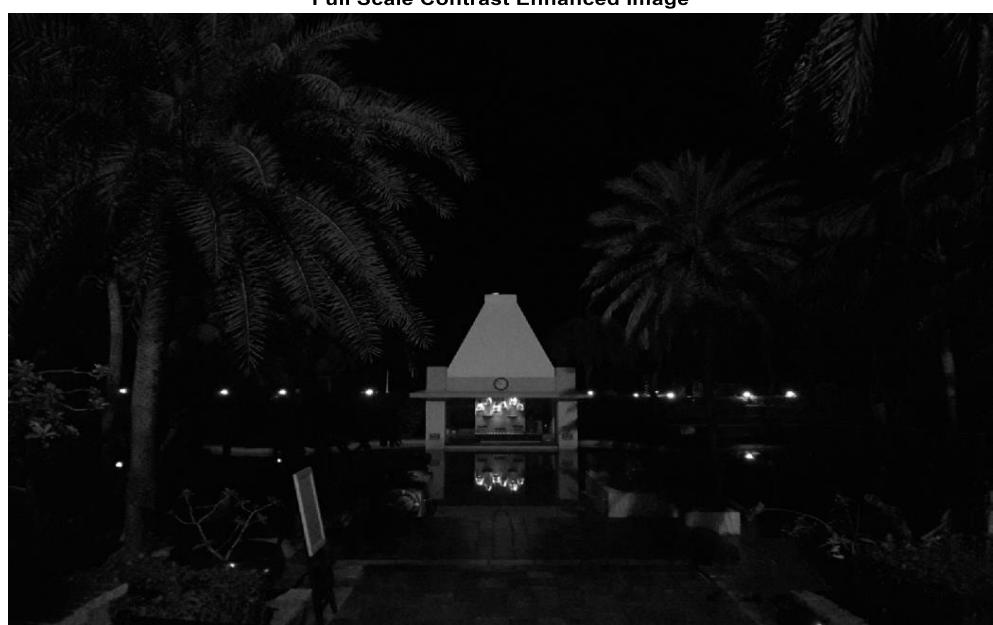
We see that histogram equalization works for this image as the image looks better than the original image visually.



We see that CLAHE works for this image as the image looks better than the original image visually.

Image : LowLight_2.png



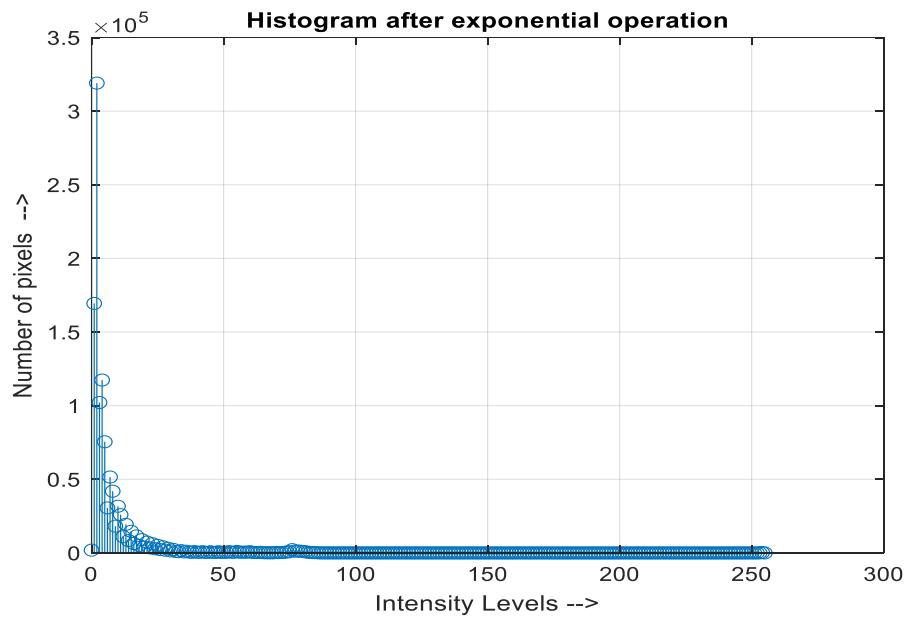


We see that full scale contrast enhancement works for this image as the image looks better than the original image visually.

Non Linear Exponential Operation



Histogram after exponential operation

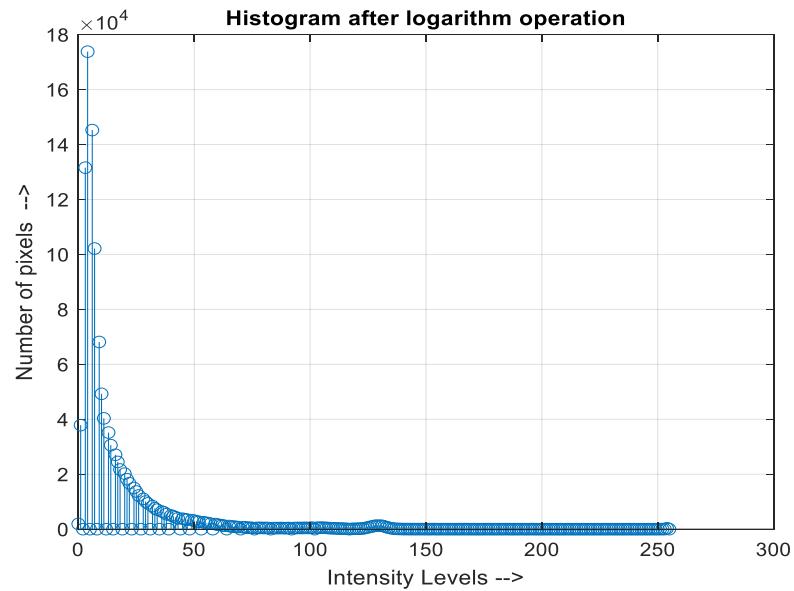


We see that exponential operation does not work for this image as the some of the image details are lost and the original image is comparatively better.

Non Linear Logarithm Operation



Histogram after logarithm operation

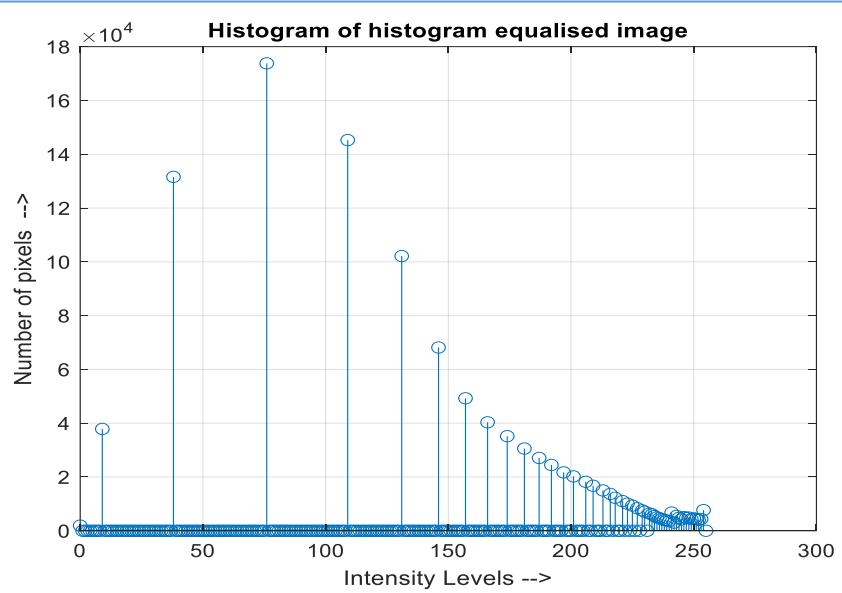


We see that logarithm operation works for this image as the image looks better than the original image visually and some of the image details are enhanced.

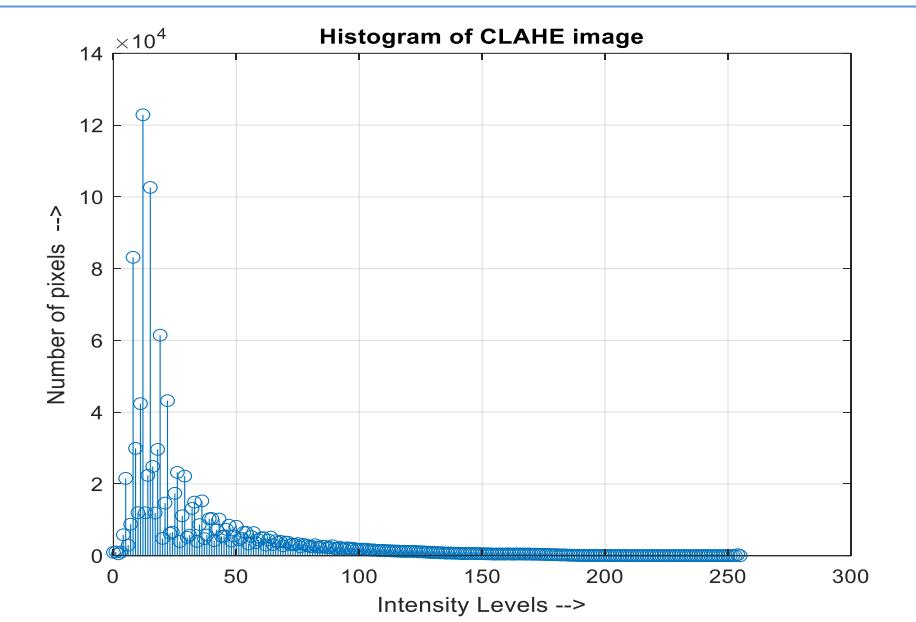
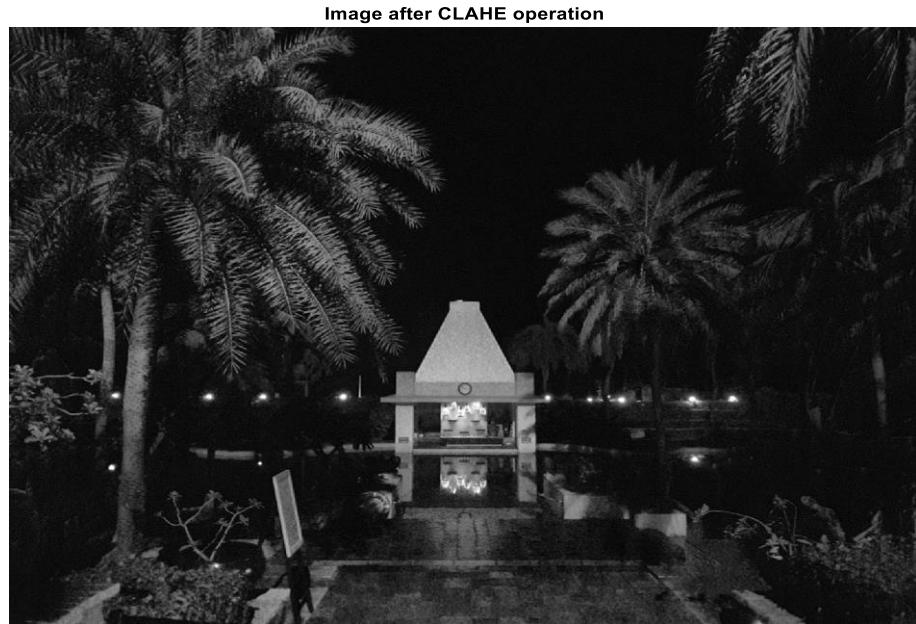
Image after histogram equalization



Histogram of histogram equalised image

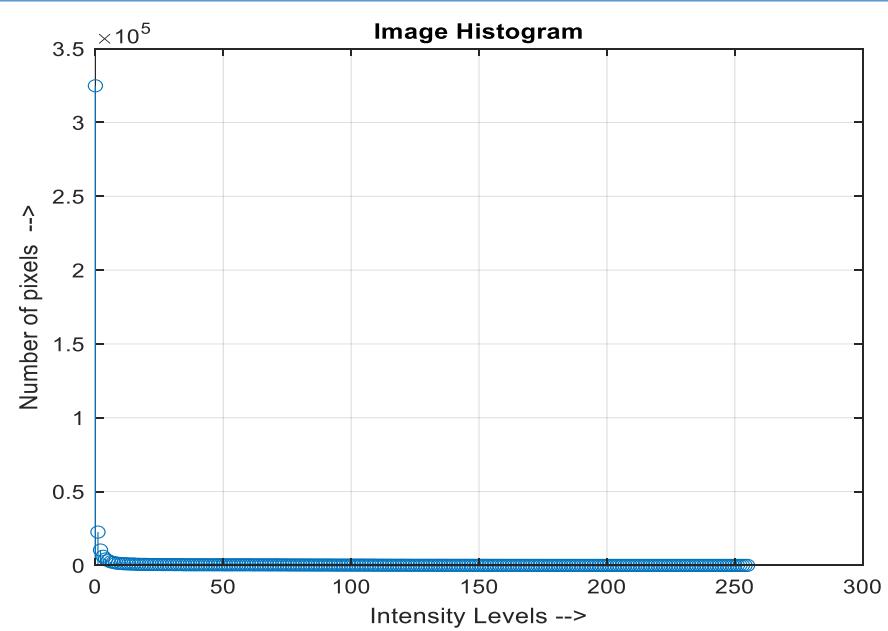


We see that histogram equalization does not work for this image and the image does not look good and looks washed out.

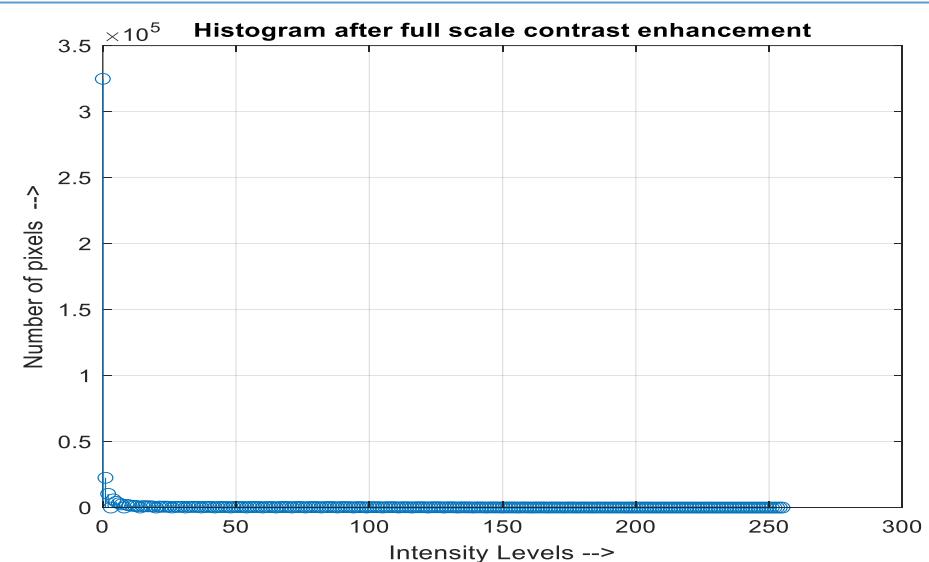


We see that CLAHE works for this image and some of the image details are enhanced.

Image : LowLight_3.png



Full Scale Contrast Enhanced Image

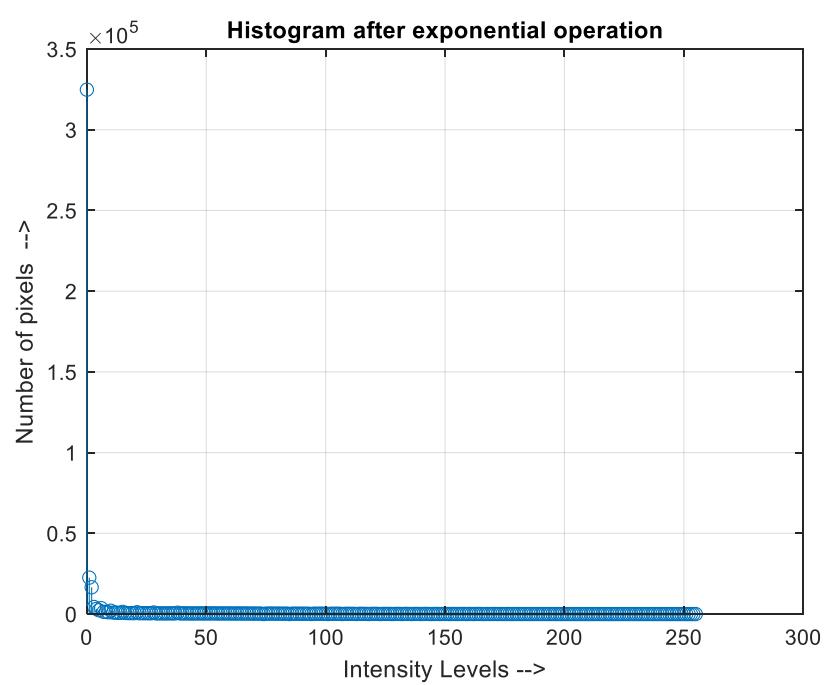


We see that full scale contrast enhancement works for this image and the image looks good visually.

Non Linear Exponential Operation



Histogram after exponential operation

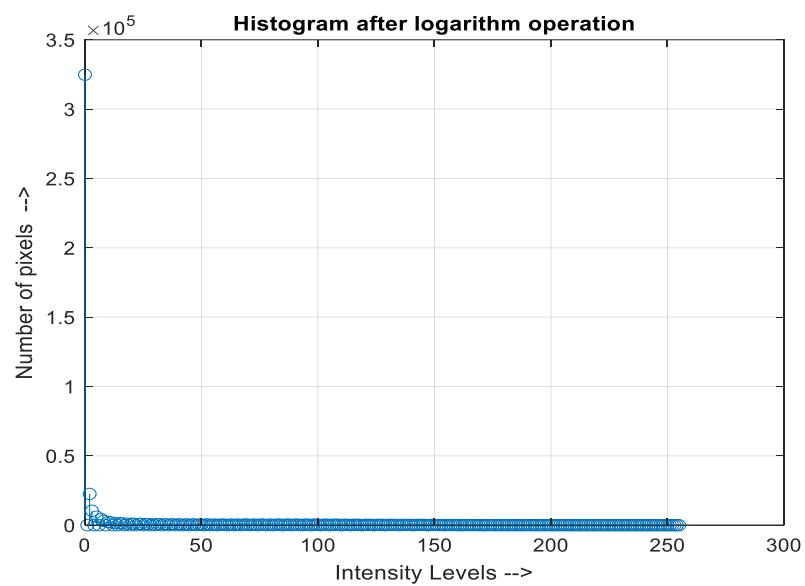


We see that exponential operation does not work for this image and image details are not brought out.

Non Linear Logarithm Operation



Histogram after logarithm operation

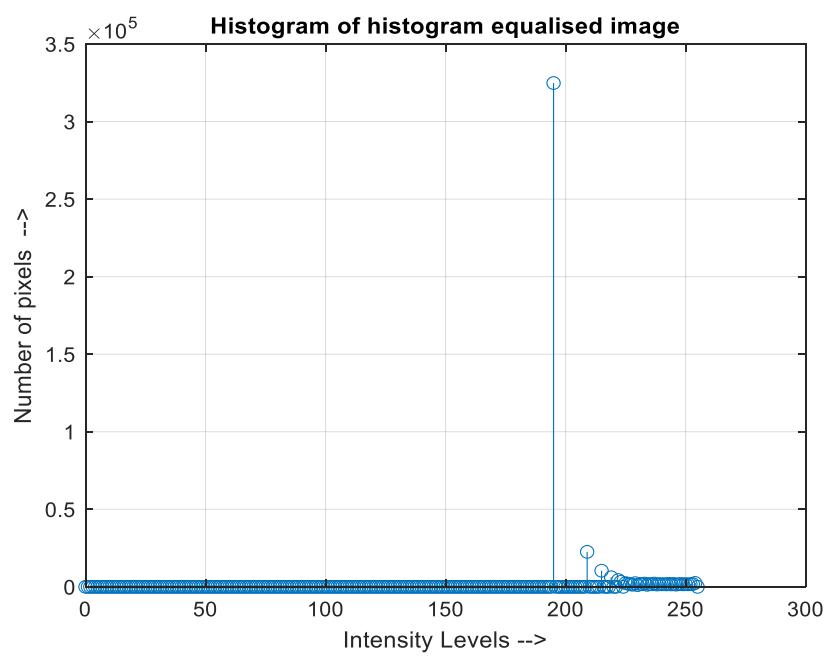


We see that logarithm operation works for this image and the image looks good.

Image after histogram equalization



Histogram of histogram equalised image

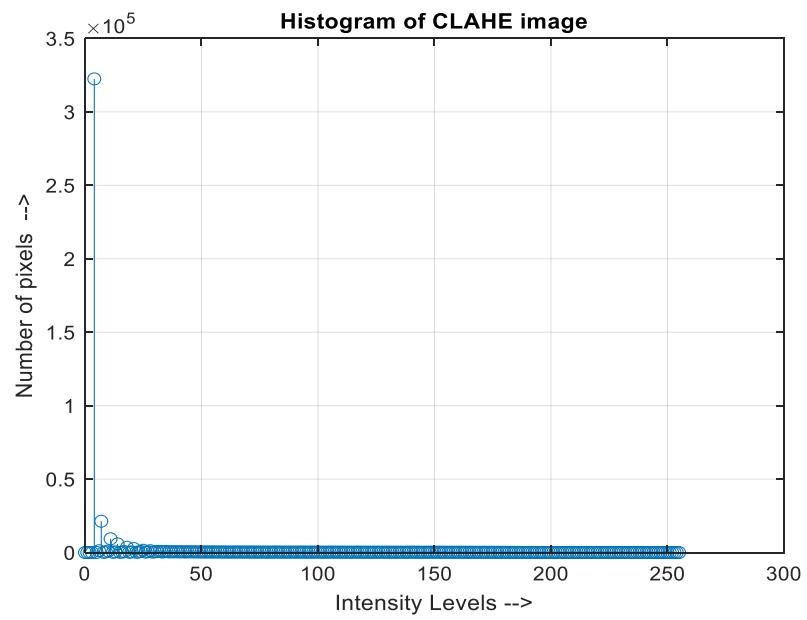


We see that histogram equalization does not work for this image and the image looks washed out.

Image after CLAHE operation

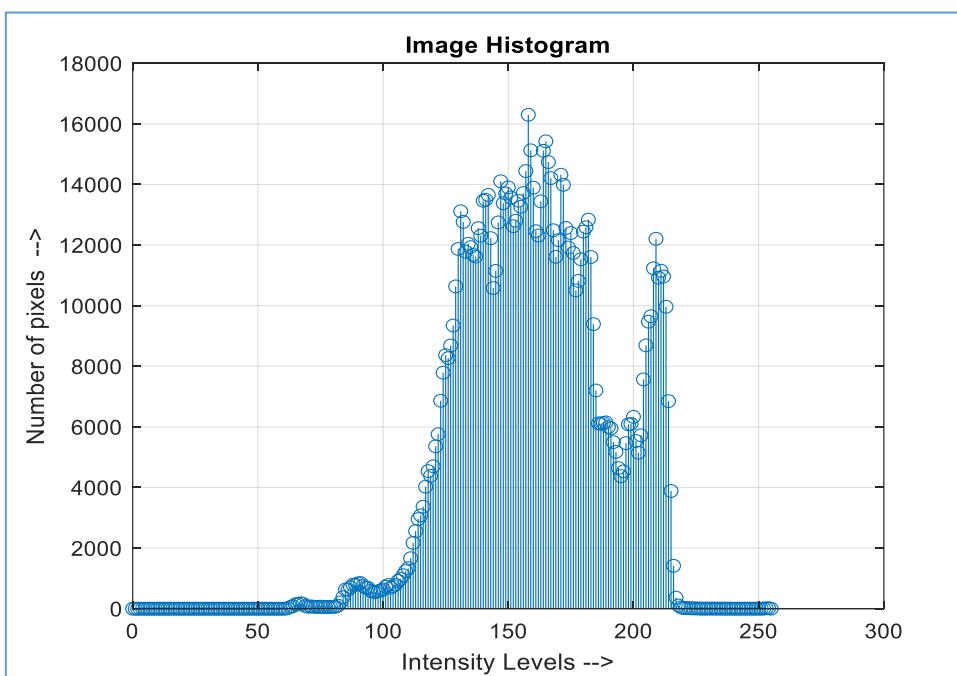


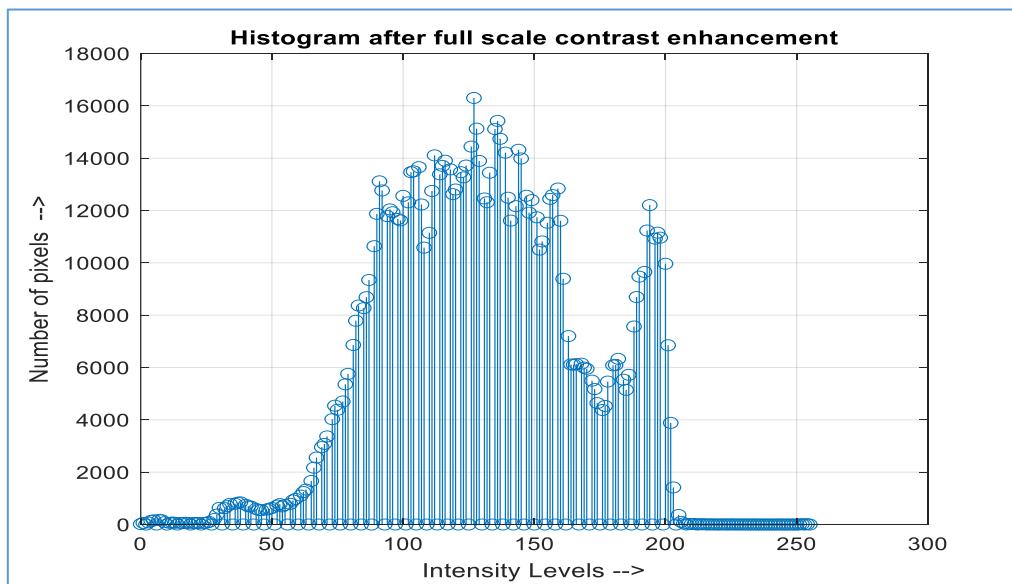
Histogram of CLAHE image



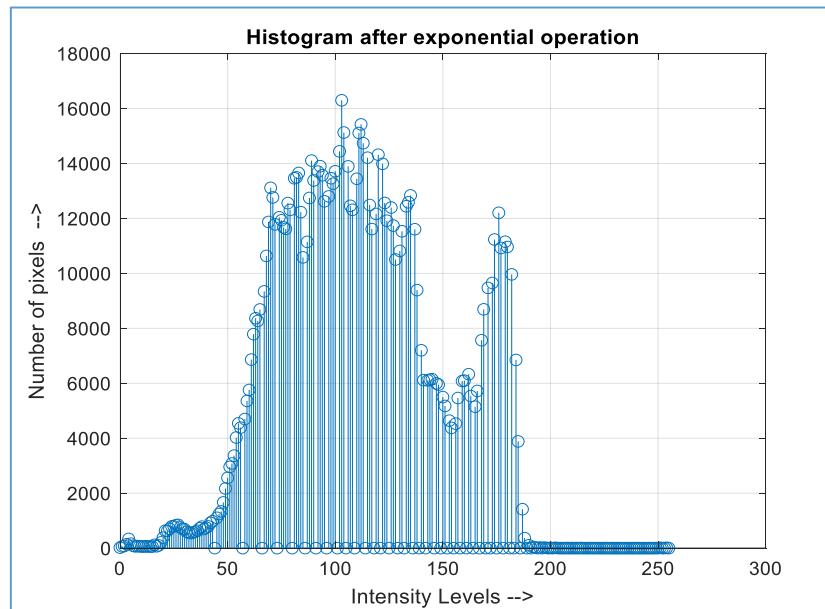
We see that CLAHE works for this image and the image looks good.

Image : Hazy.png

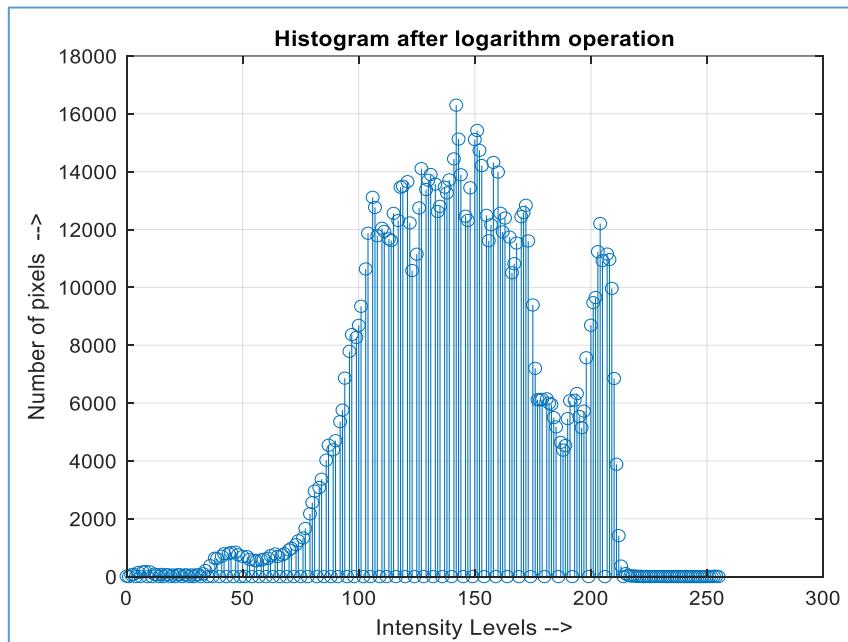




We see that Full Scale Contrast Enhancement does not work for this image and the image looks similar to the original.



We see that Exponential Operation does not work for this image and the image looks similar to the original.

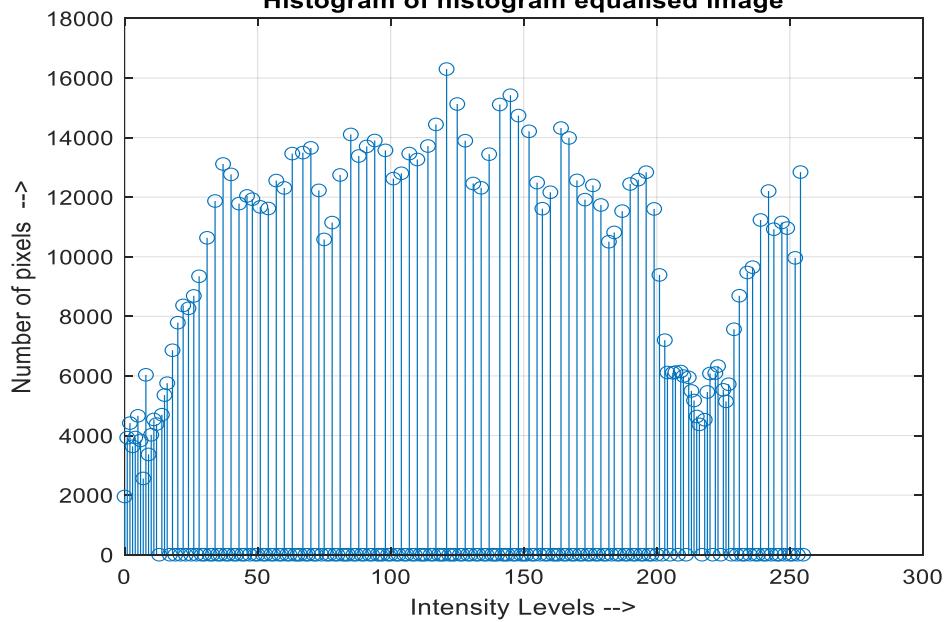


We see that Logarithm operation does not work for this image and the image is more washed out than the original.

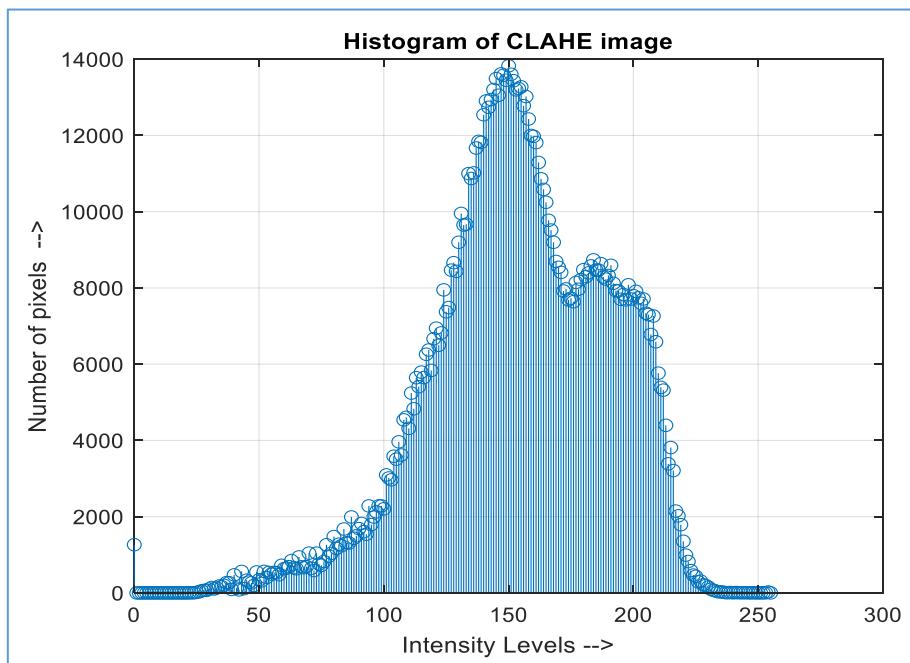
Image after histogram equalization



Histogram of histogram equalised image



We see that histogram equalization works for this image and the image details are brought out.



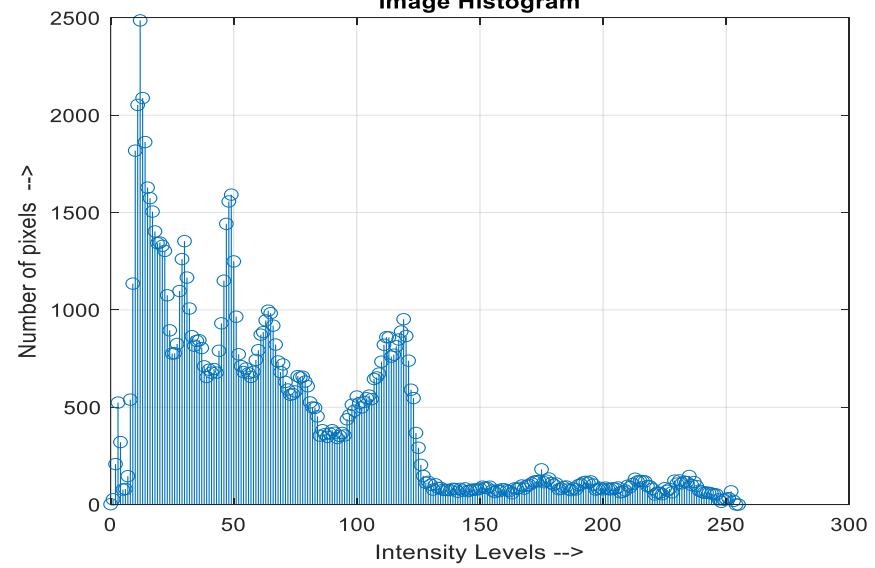
We see that CLAHE works for this image as some of the image details are brought out.

Image : StoneFace.png

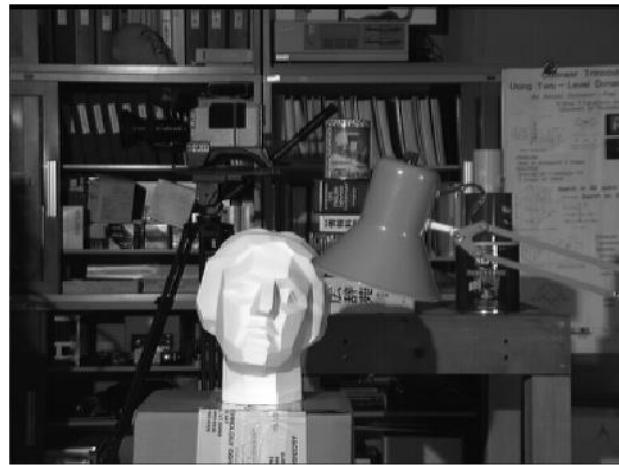
Original Image



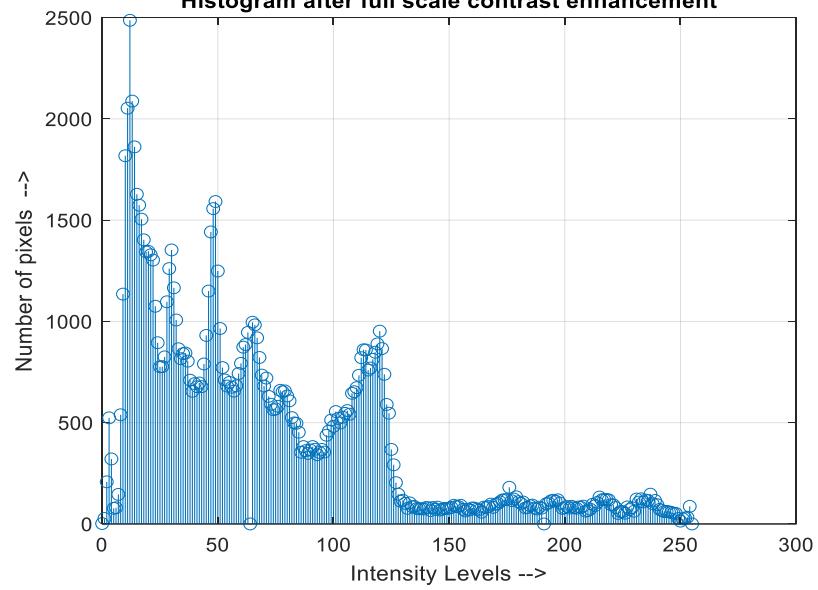
Image Histogram



Full Scale Contrast Enhanced Image



Histogram after full scale contrast enhancement

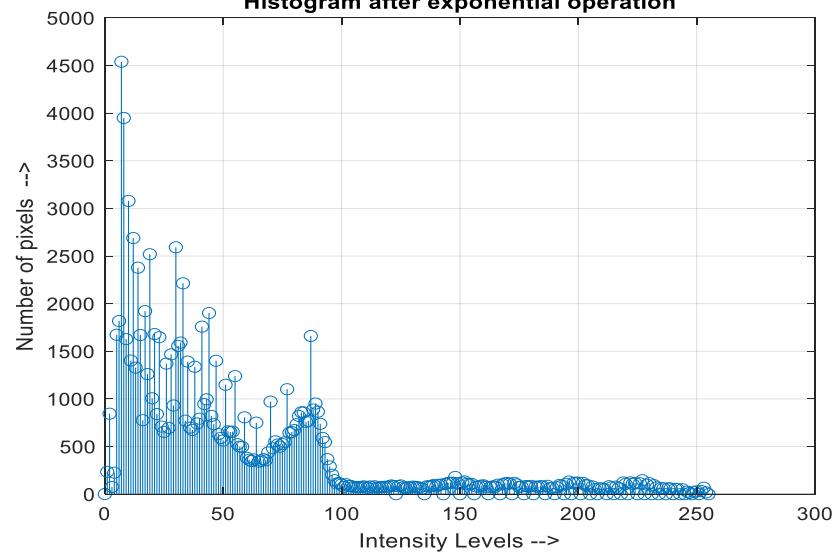


We see that Full Scale Contrast Enhancement works for this image and some of the image details are enhanced.

Non Linear Exponential Operation



Histogram after exponential operation

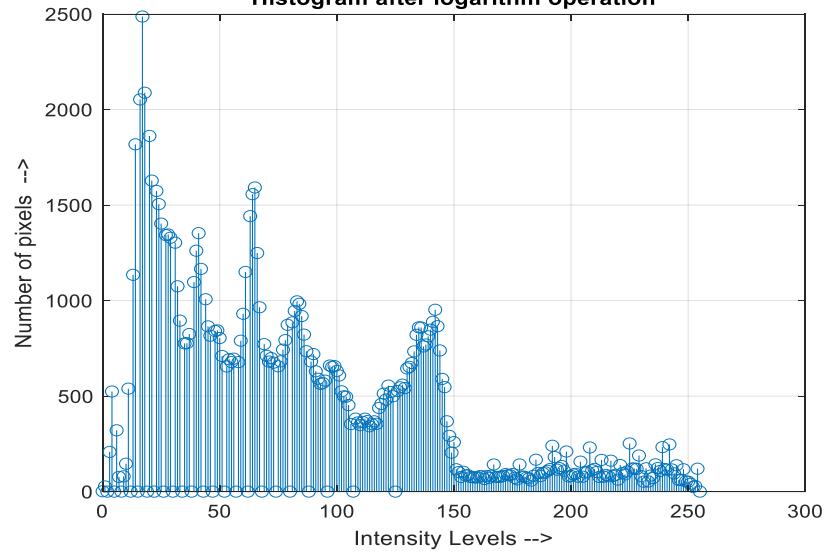


We see that exponential operation works for this image and some of the image details are enhanced.

Non Linear Logarithm Operation

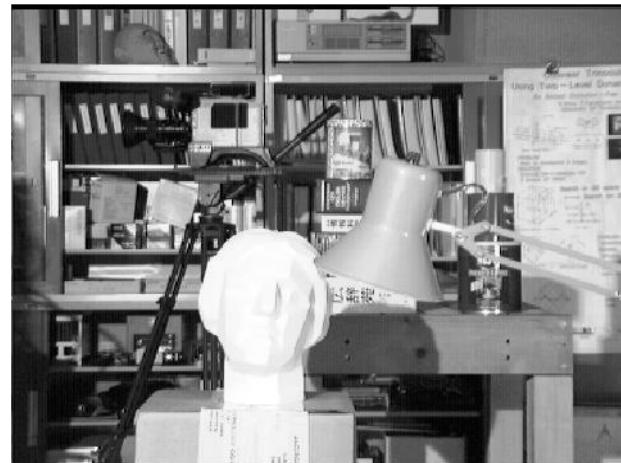


Histogram after logarithm operation

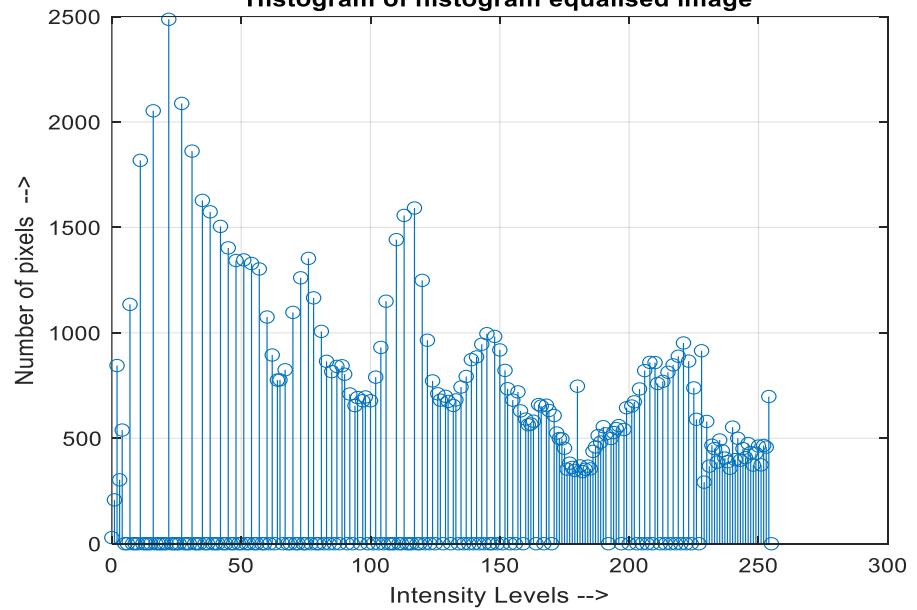


We see that logarithm operation works for this image and image details are enhanced.

Image after histogram equalization

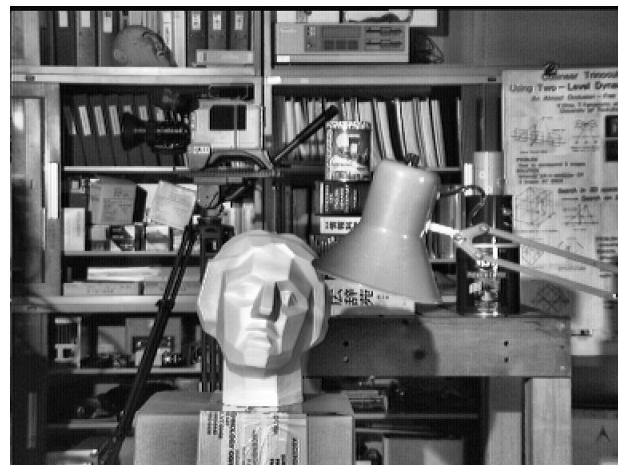


Histogram of histogram equalised image

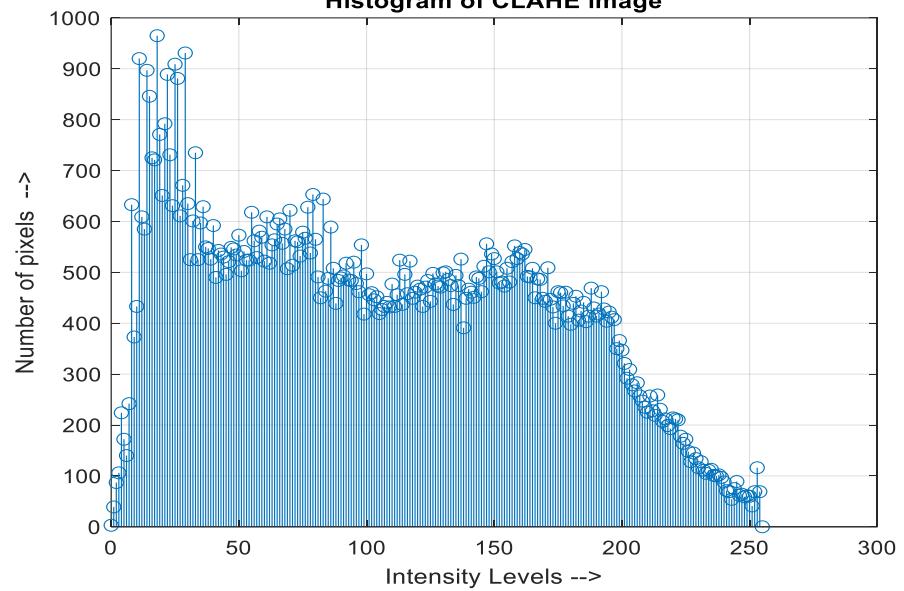


We see that histogram equalization works for this image and the image looks better than the original

Image after CLAHE operation



Histogram of CLAHE image



We see that CLAHE works for this image and image details are enhanced.

Question 2

Bee.jpg

Original Image



K=2

Bilinear interpolation MSE value: 615.5124

Nearest Neighbor interpolation MSE value: 513.059

Image after nearest neighbor interpolation



Image after bilinear interpolation



K=3

Bilinear interpolation MSE value: 774.3946

Nearest Neighbor interpolation MSE value: 1081.4898

Image after nearest neighbor interpolation



Image after bilinear interpolation



Image : StoneFace.png

Original Image



K=2

Bilinear interpolation MSE value: 308.1981

Nearest Neighbor interpolation MSE value: 216.6841

Image after nearest neighbor interpolation



Image after bilinear interpolation



K=3

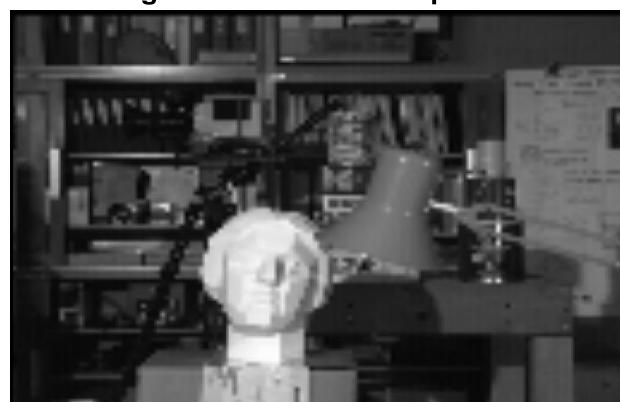
Bilinear interpolation MSE value: 586.6452

Nearest Neighbor interpolation MSE value: 777.5497

Image after nearest neighbor interpolation



Image after bilinear interpolation



Question 3

Image : Bee.jpg

Original Image



Rotation by 30 degrees clockwise



Rotation by 75 degrees clockwise

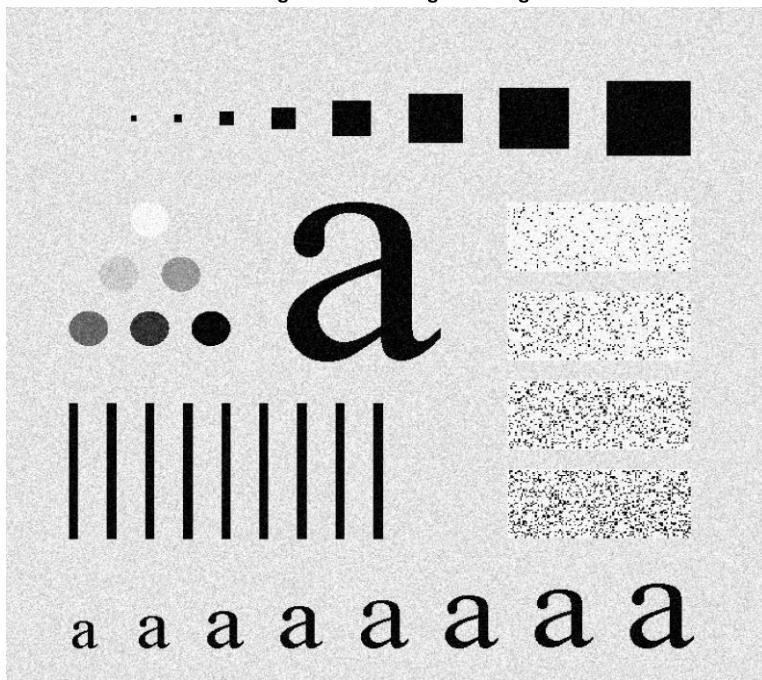


Rotation by 45 degrees counter clockwise



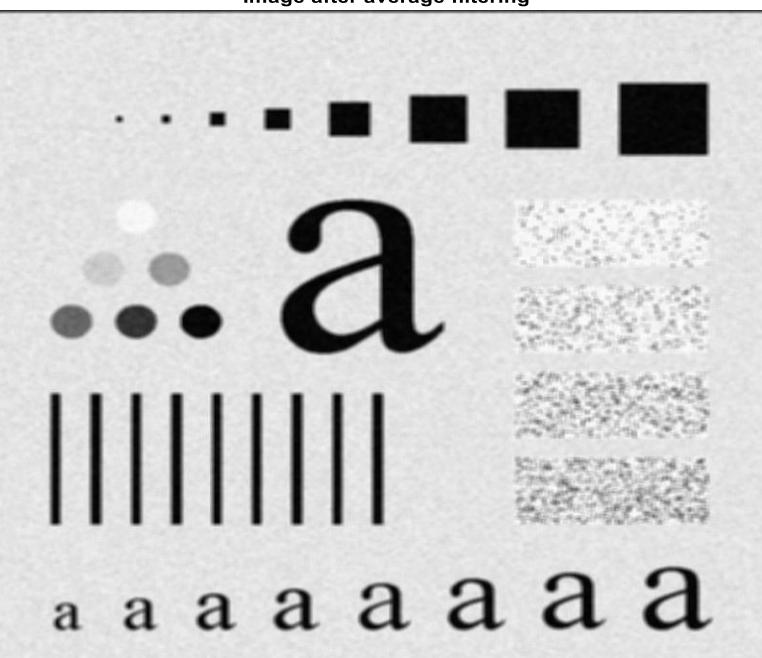
Question 4

Image before average filtering

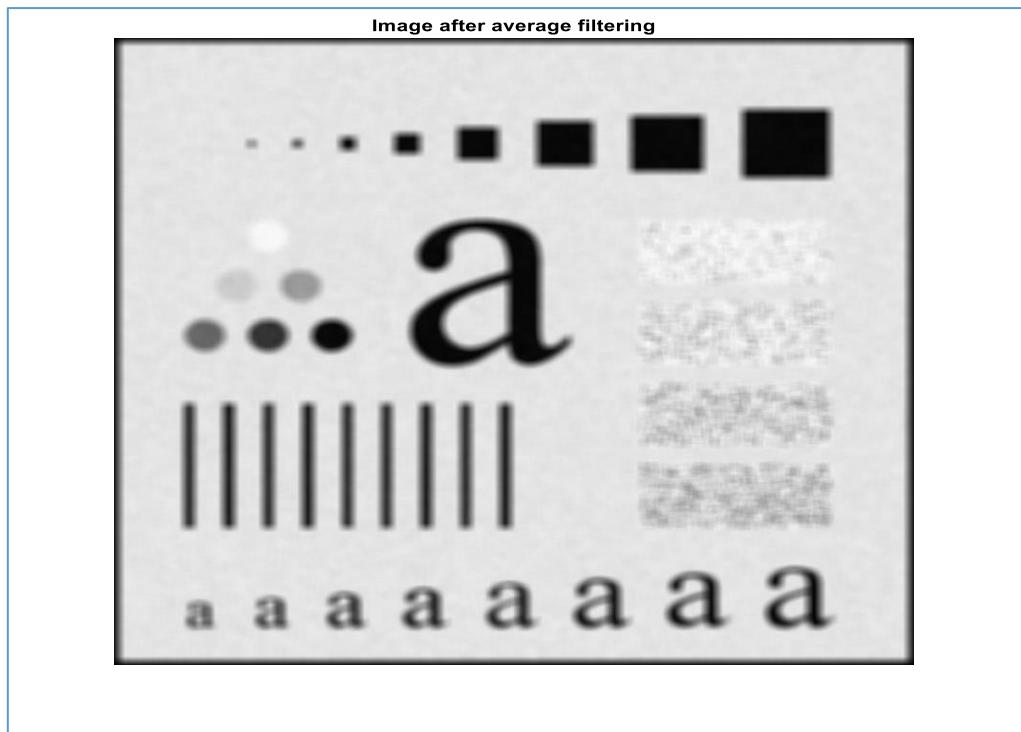


Mask size =5

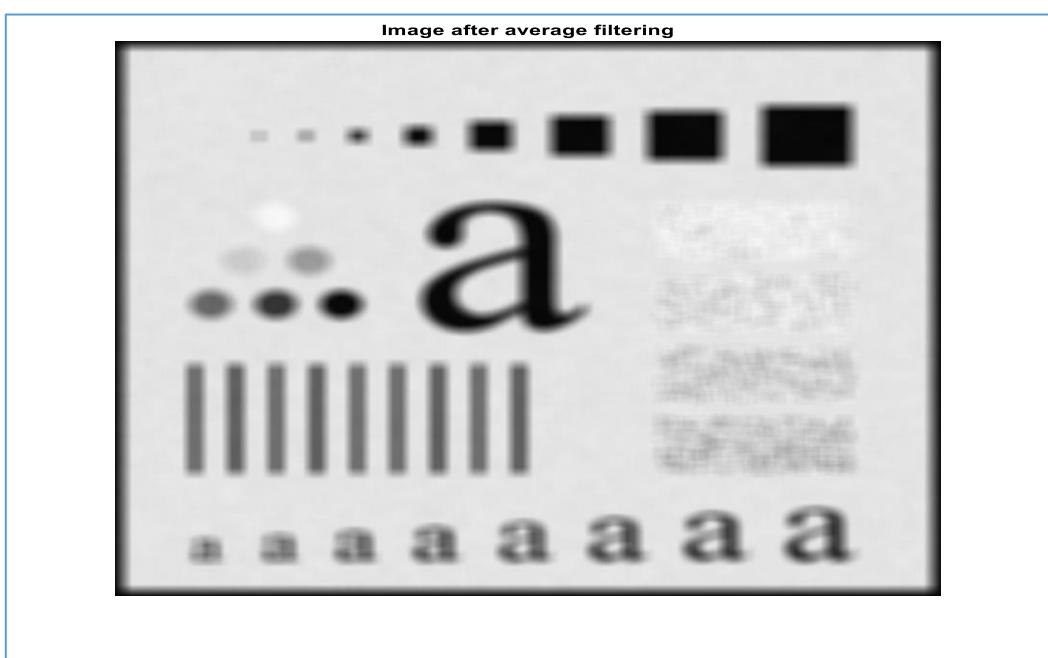
Image after average filtering



Mask Size=10



Mask Size=15



We see that with increasing mask size the image becomes more and more blur.

Clean image(characters.tif)

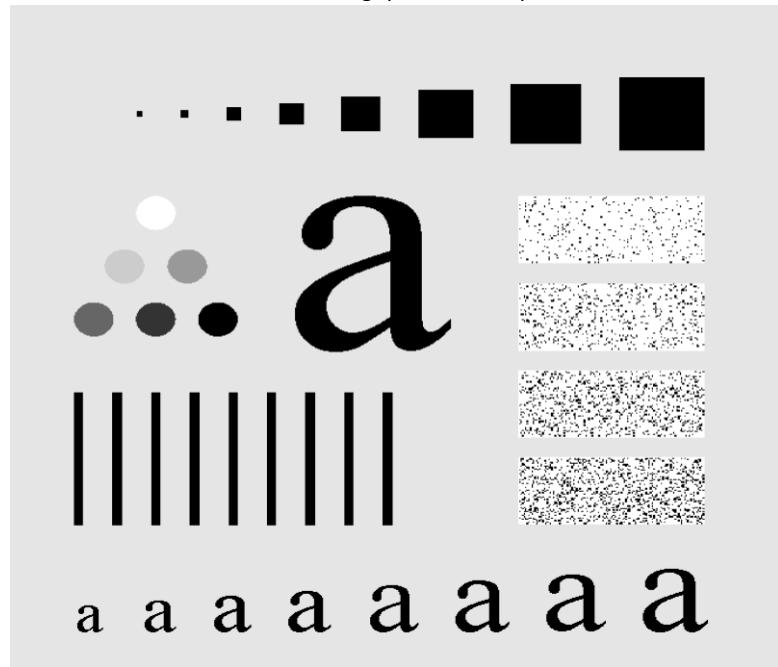
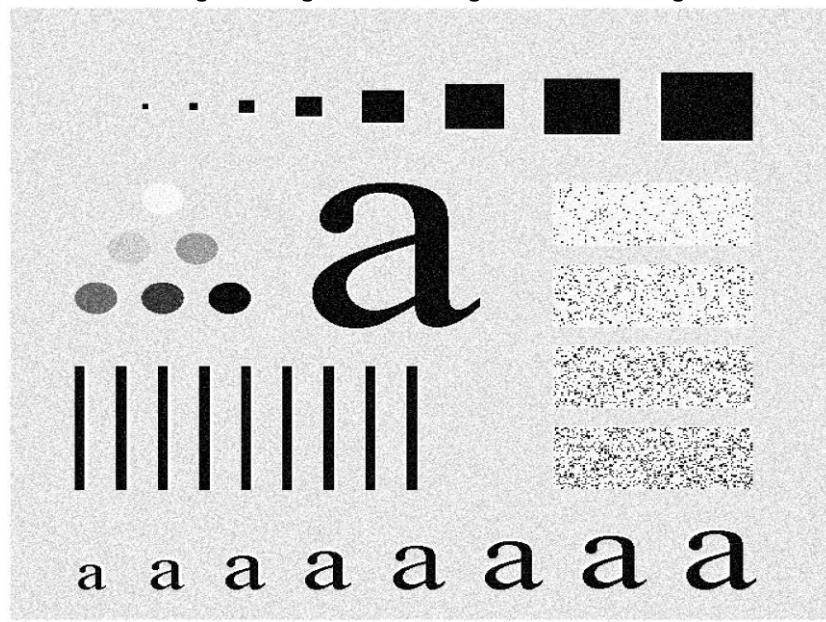
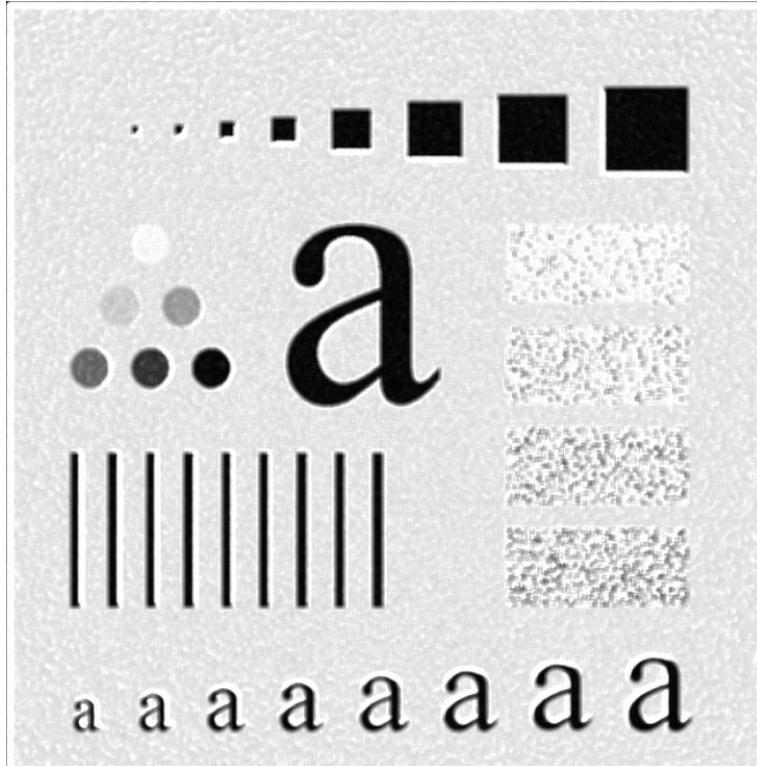


Image after high boost filtering without smoothing



We see that if we apply high boost filtering without smoothing the image still looks noisier.

Image after high boost filtering after smoothing



We see that if we smooth the image before high boost filtering the noise in the output image is much less.

Question 5

Template Image



Target Image



Result of Vanilla Template Matching



Result of Histogram Matching followed by Template Matching



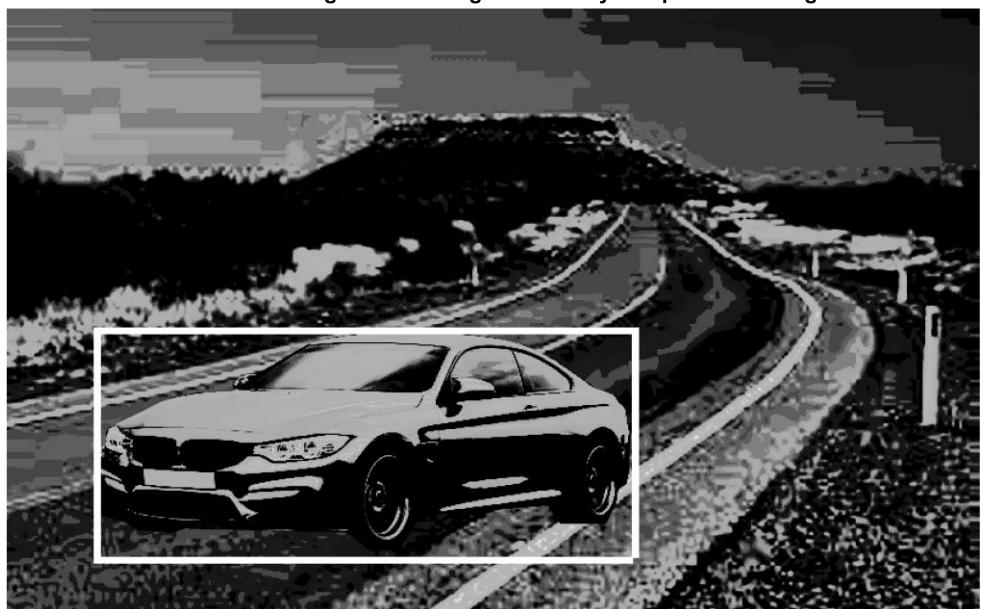
Target Image



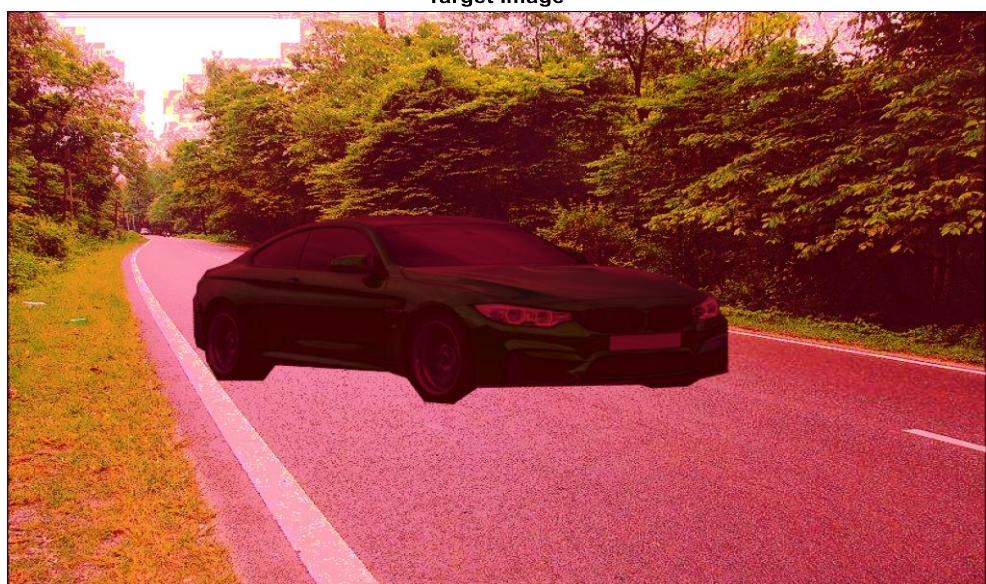
Result of Vanilla Template Matching



Result of Histogram Matching followed by Template Matching



Target Image



Result of Vanilla Template Matching



Result of Histogram Matching followed by Template Matching



Target Image



Result of Vanilla Template Matching



Result of Histogram Matching followed by Template Matching



Target Image



Result of Vanilla Template Matching



Result of Histogram Matching followed by Template Matching

