

# Report for Part 2 of the Assignment1 - Gray-Level Transformation

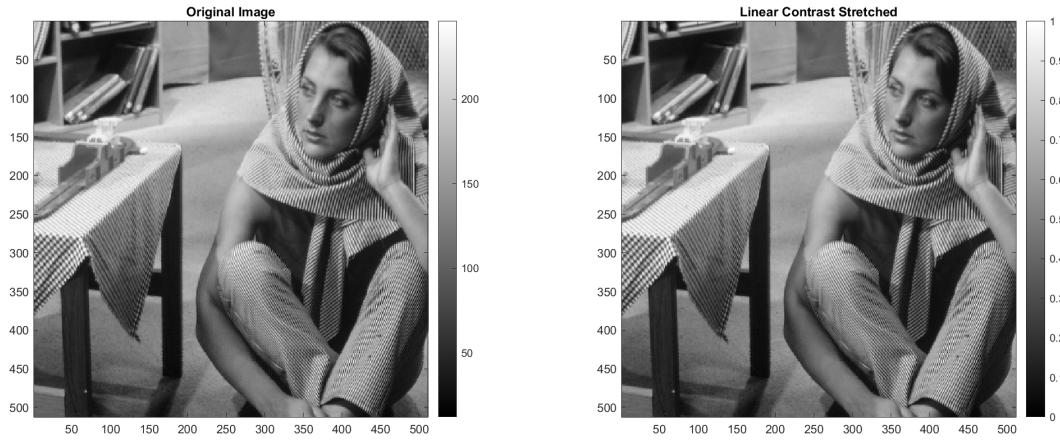
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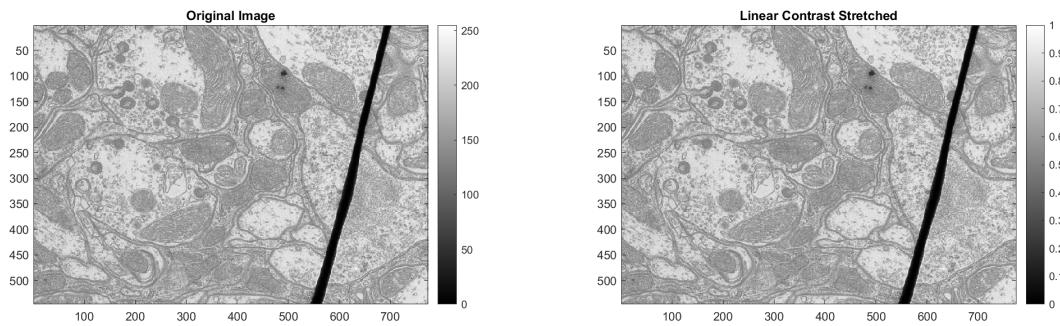
### Linear Contrast Stretching

**Formula applied for Linear Contrast Stretching:**

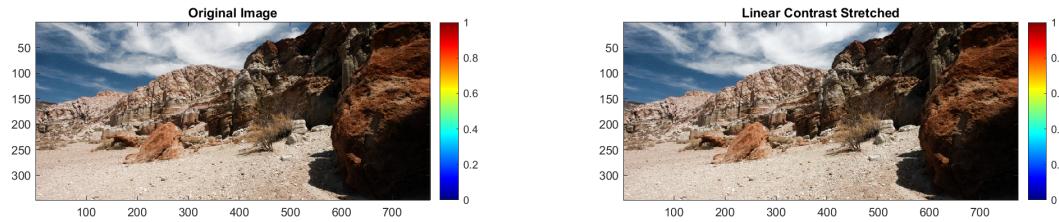
$$I_{\text{new}}(x,y) = (I_{\text{old}}(x,y) - \min(I_{\text{old}})) / (\max(I_{\text{old}}) - \min(I_{\text{old}}))$$



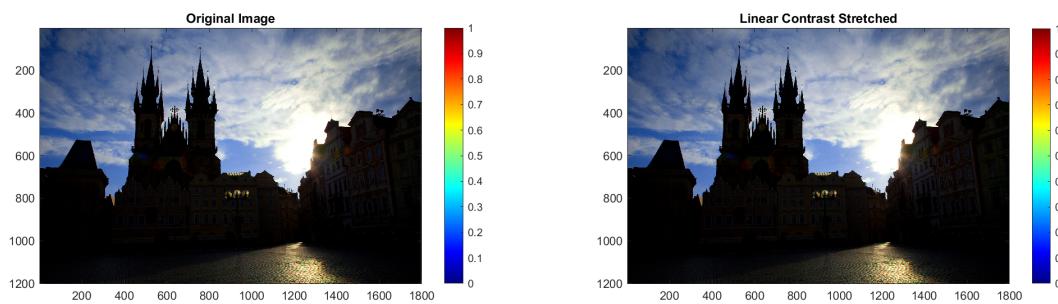
Pixel info: (491, 266) 160



Pixel info: (743, 287) 165



Pixel info: (743, 188) [17 13 10]

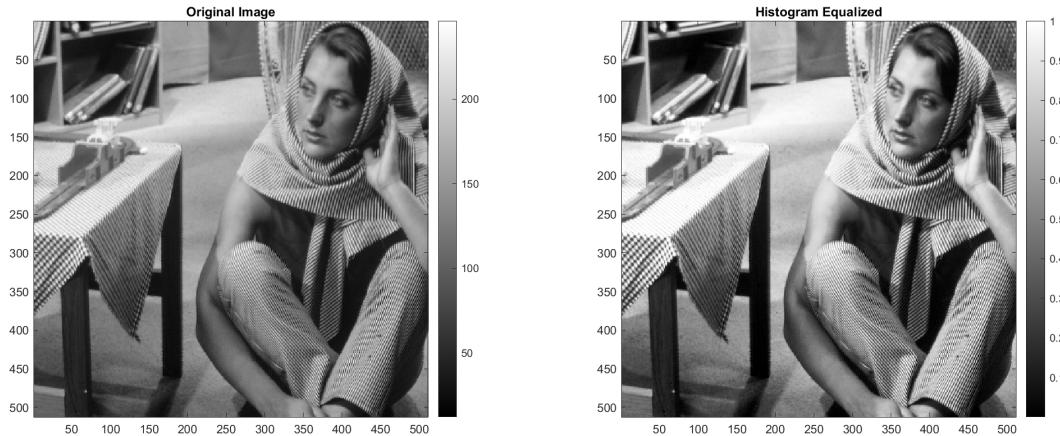


Pixel info: (1782, 634) [8 3 7]

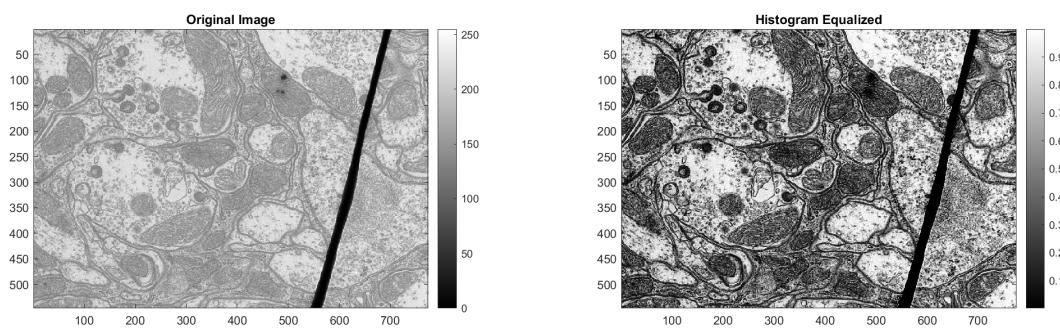
#### Observations for Image(5):

There isn't much change. Linear Contrast stretching is not effective here as for every channel, the minimum (0) and maximum (255) pixel intensities are already present and hence linear mapping does not result in any change according to the formula.

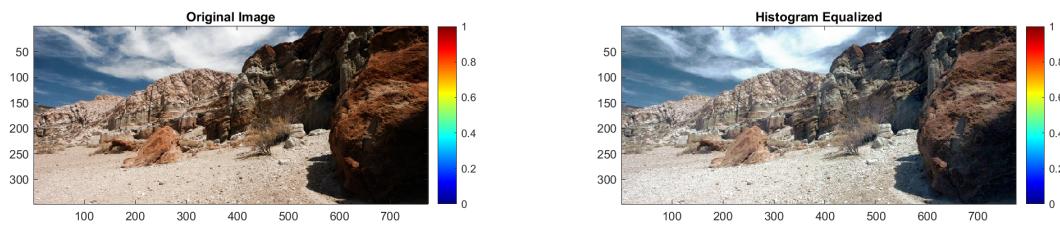
#### Histogram Equalization



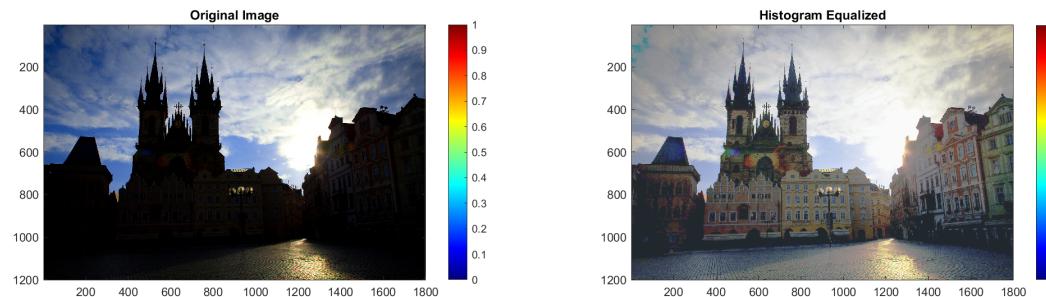
Pixel info: (491, 266) 160



Pixel info: (743, 287) 165



Pixel info: (743, 188) [17 13 10]



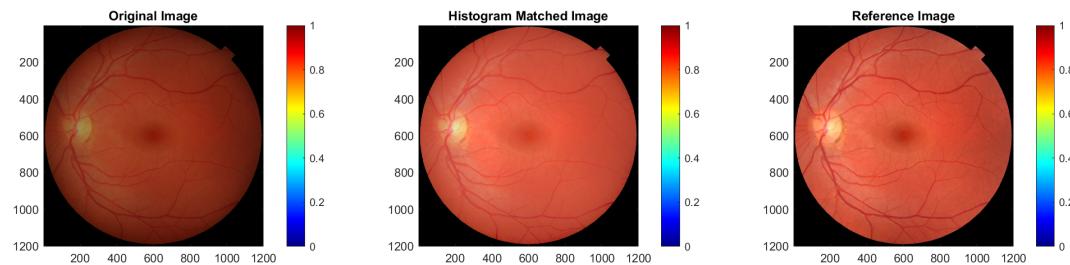
Pixel info: (1782, 634) [83.7]

#### Observations for image(5):

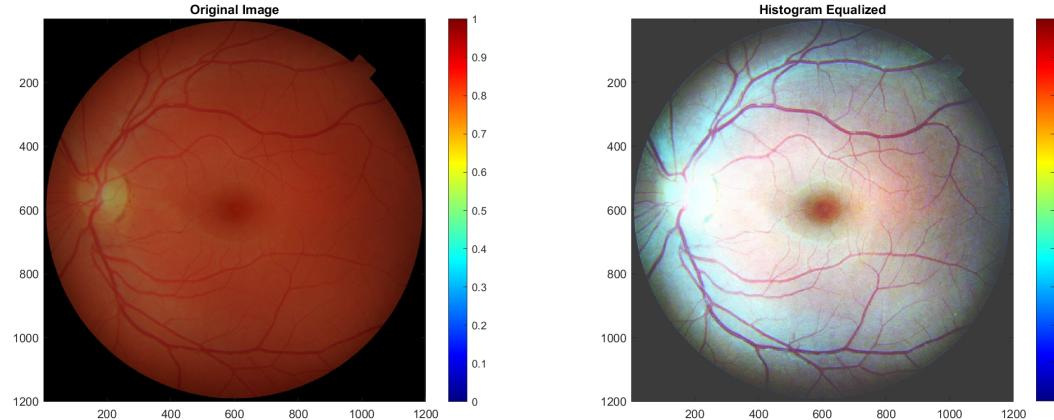
There is a noticeable change in the contrast of the image.

We can clearly see the parts in new image which were underlit in the original image and hence we would prefer Histogram Equalization for this image.

#### Histogram Matching



Pixel info: (X, Y) Pixel Value

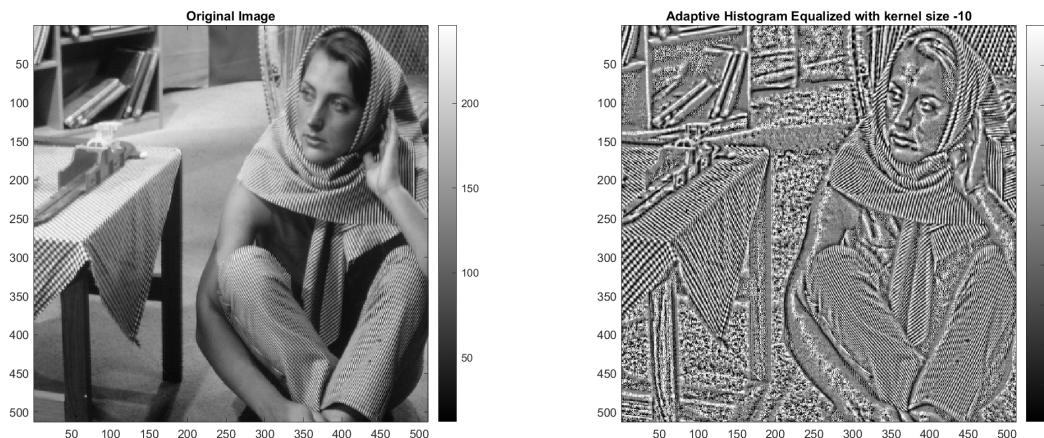


Pixel info: (1188, 623) [78 28 19]

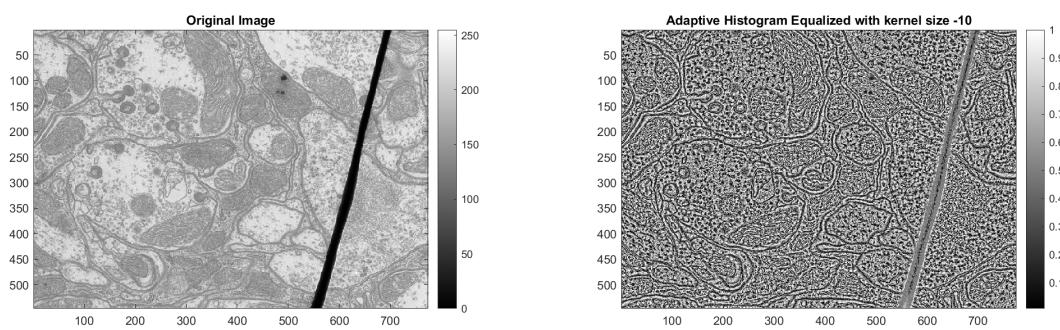
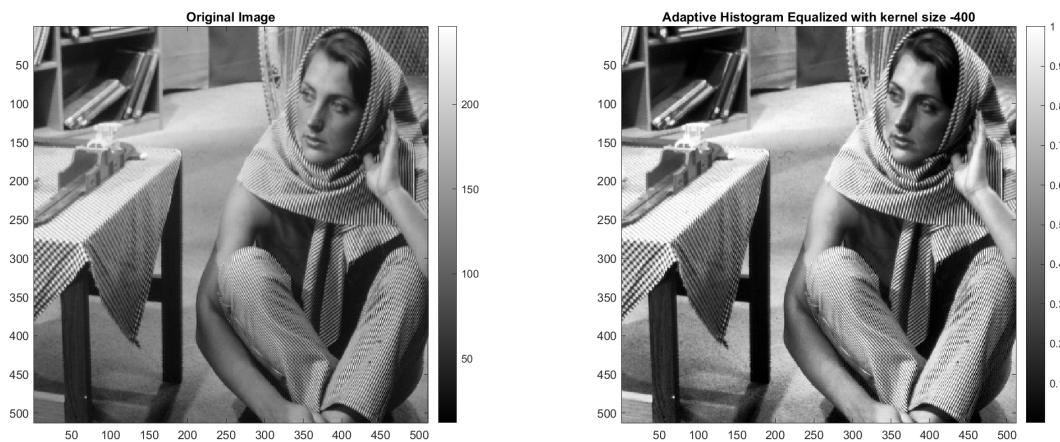
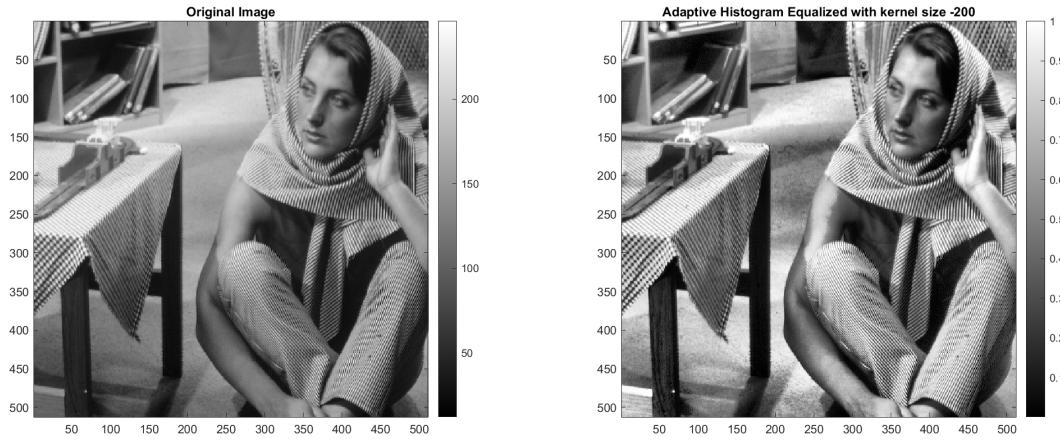
#### Observations:

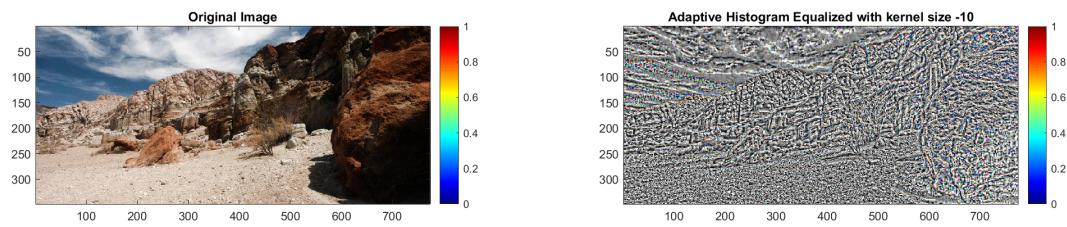
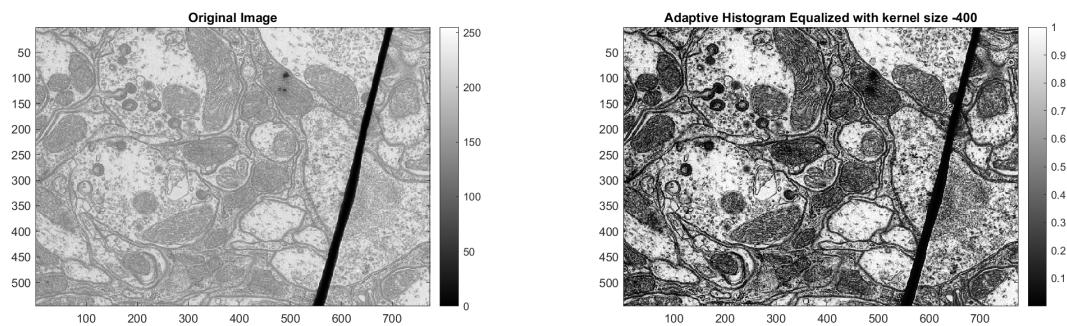
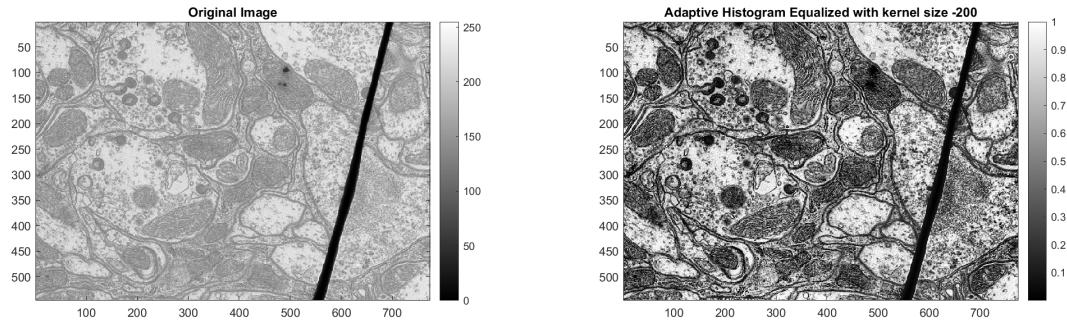
Histogram Equalization done on different channels leads to an image in which the blue channel gets visibly more enhanced. Since in Histogram matching as we are matching the image with a reference image, the reddish colour of the new image is retained

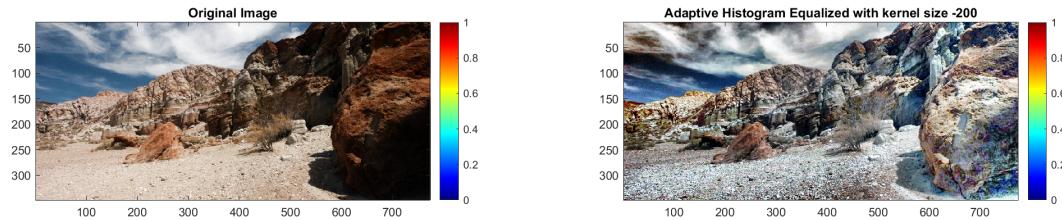
#### Adaptive Histogram Equalization



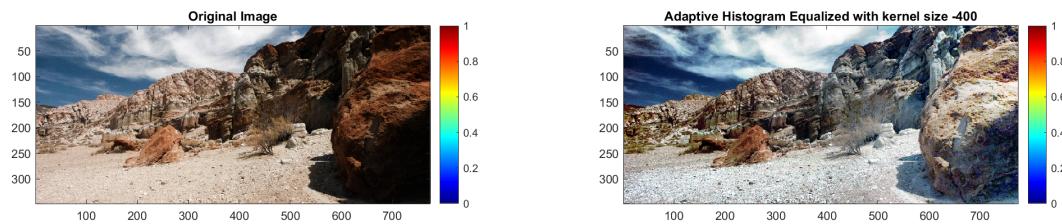
Pixel info: (X, Y) Pixel Value







Pixel info: (X, Y) Pixel Value

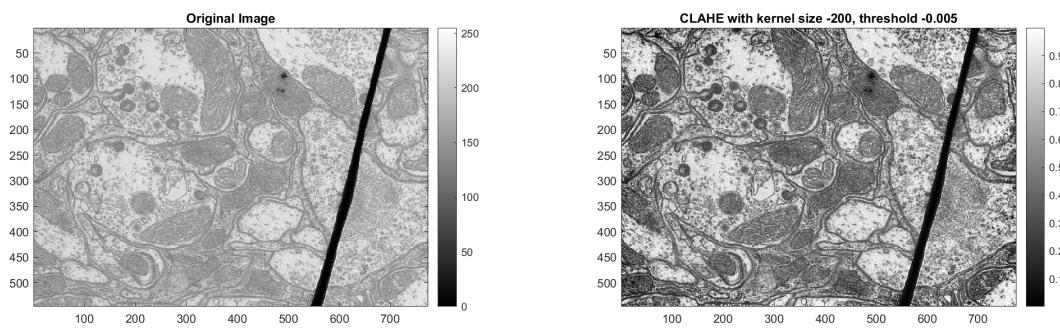
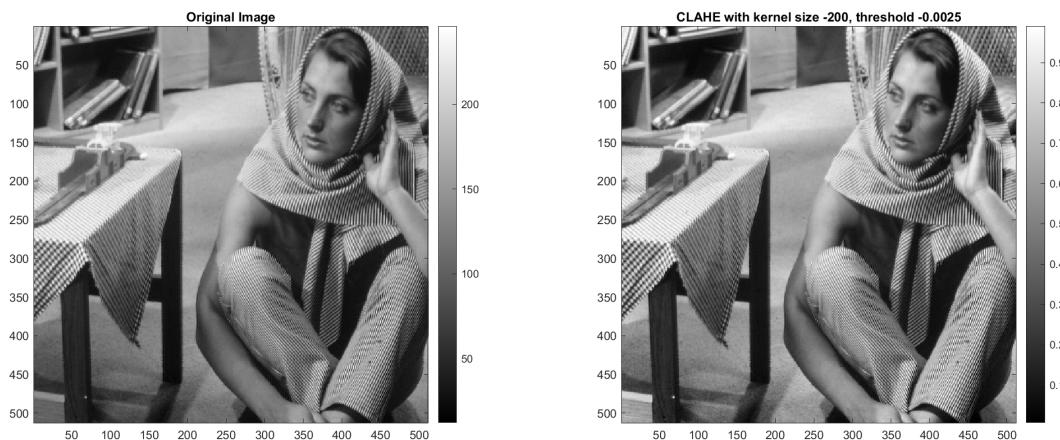
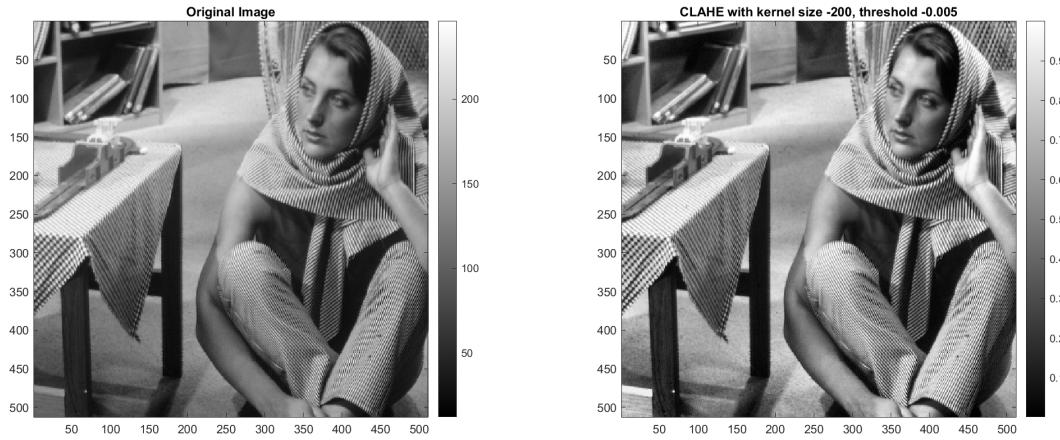


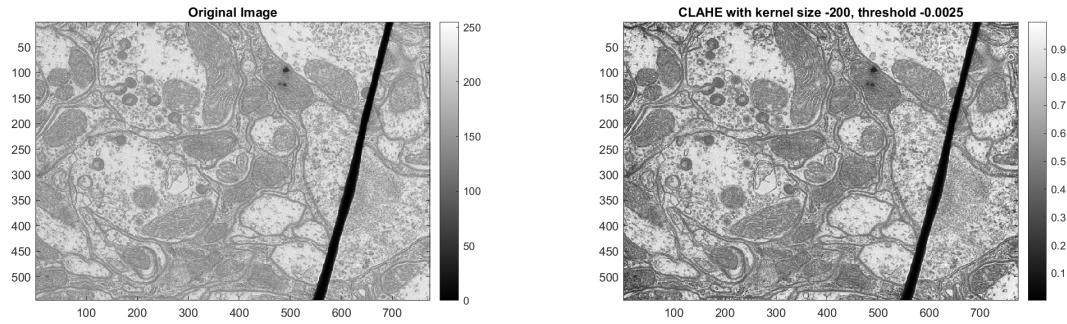
Pixel info: (X, Y) Pixel Value

**Observations:**

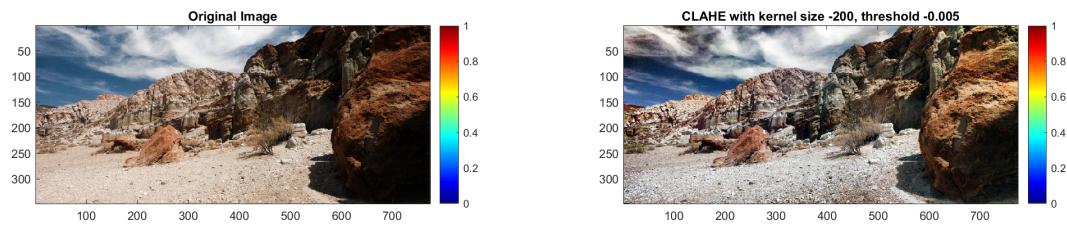
As can be seen in the images, keeping a kernel size of 10 results in the noise amplification effect. With a kernel size of 400 the contrast improves. A kernel size of 200, found after tuning is a good tradeoff between the two.

**Contrast Limited Adaptive Histogram Equalization**

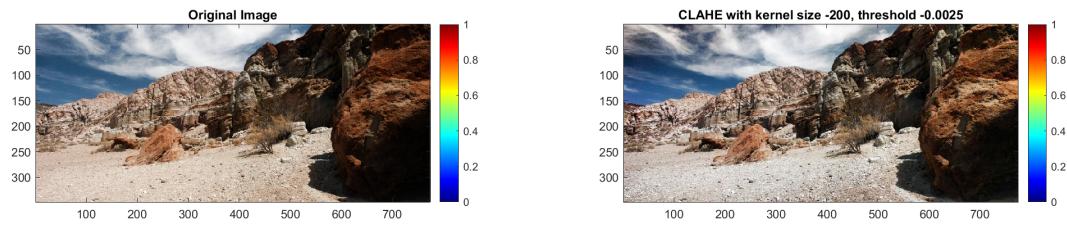




Pixel info: (X, Y) Pixel Value



Pixel info: (X, Y) Pixel Value



Pixel info: (X, Y) Pixel Value

**Observations:**

The threshold after tuning was decided to be 0.005.

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