Team:

- Avyakta Wrat 180070010
- Meeta Malviya 180070034
- Nayan Barhate 180070037
- Varad Mane 18D070034

Q3a. By preservation of mass, we have (α is given in question)

$$\int_{0}^{a} h_{1e}(I)dI = \int_{0}^{a} h_{1}(I)dI = \alpha \& \int_{a}^{1} h_{2e}(I)dI = \int_{a}^{1} h_{2}(I)dI = 1 - \alpha$$

where $h_{1e}(I)$ & $h_{2e}(I)$ are equalized histograms for regions [0, a] and (a, 1] respectively Equalized histograms imply $h_{1e}(I)$ and $h_{2e}(I)$ are constants in their respective domains

$$h_{1e}(I) = \frac{\alpha}{a}$$
 and $h_{2e}(I) = \frac{1-\alpha}{1-a}$

Mean Intensity for the new histogram = $\int_{0}^{a} I \cdot h_{1e}(I) dI + \int_{a}^{1} I \cdot h_{2e}(I) dI = \frac{1+a-a}{2}$

Q3b. Given the mean intensity of the original histogram

$$\int_{0}^{a} I. h_{1}(I) dI + \int_{a}^{1} I. h_{2}(I) dI = a$$

And the median intensity of the original histogram is also a:

$$\int_{0}^{a} h_{1}(I)dI = \int_{a}^{1} h_{2}(I)dI$$

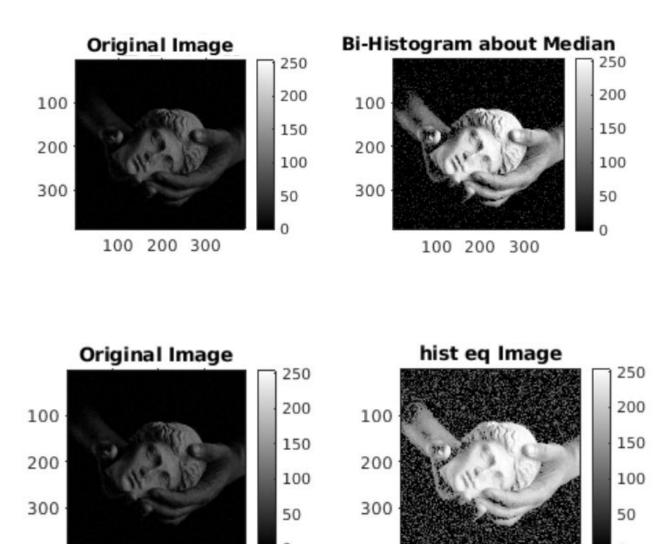
$$\Rightarrow \alpha = 1 - \alpha \Rightarrow \alpha = 0.5$$

Mean intensity of resulting = $\frac{0.5 + a}{2}$

Q3c. Simple histogram equalization is likely to fail where there are a high number of pixels concentrated at some bright pixel value than the others and we flatten/normalize it across the 0 to 255-pixel intensity range, hence losing the brightness. Or if there is noise of a contrasting pixel value in the background, it can get amplified upon normal histogram equalization.

Please refer to the next page for part d

Q3d. I found a picture in the assignment itself. Figure 2 and figure 1 respectively in the code file are showing Bi-histogram and equalized histogram images.



100 200 300

100 200 300