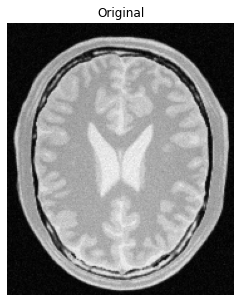
**Question 1**

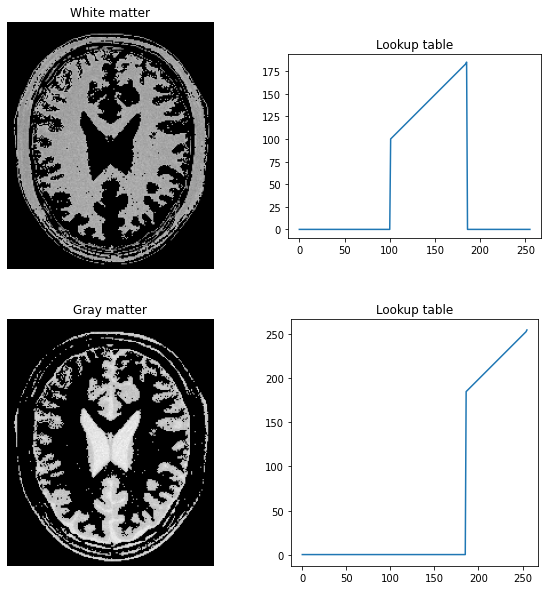
To achieve intensity, transform for the image given a lookup table method is used. As the pixel values are in uint8 type those values can directly used as indexes to access mapped values in lookup table. Using NumPy array of 256 elements functionality of lookup table can achieved.



**Question 2**

In the question we were given proton density image of the brain. These images show gray color for the white matter and white color for the gray matter. Therefore, we can attenuate white color and dark colors using point function to accentuate gray color and attenuate gray colors and dark colors to accentuate white color as bellow.

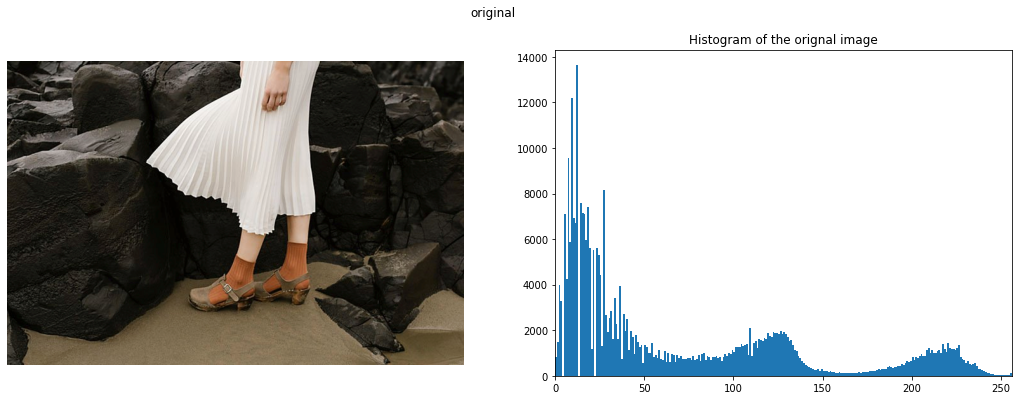
Here I have preserved the original variations of the white and gray matter areas.

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**Question 3**

In L\*a\*b color space we can manipulate perceptual lightness and red, green, blue, and yellow four unique colors of human vision. L axis contains lightness factor. Appling gamma correction changes the lightness of the image. For gamma< 1 higher lightness can observe while gamma>1 shows lower lightness.

Original image and its histogram is shown below.



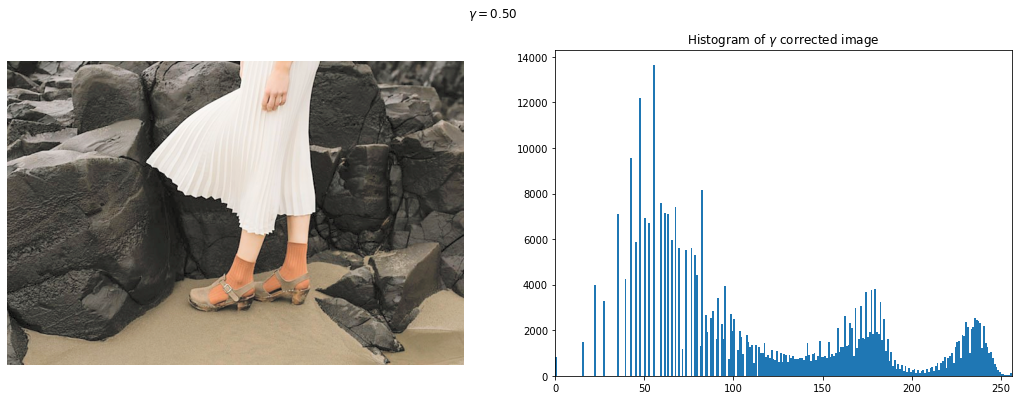


Gamma correction is done using a lookup table as above. This lookup table can visualize as bellow.

A picture containing venn diagram

Description automatically generated

After Applying this correction, we can observe the output image and its histogram as bellow.



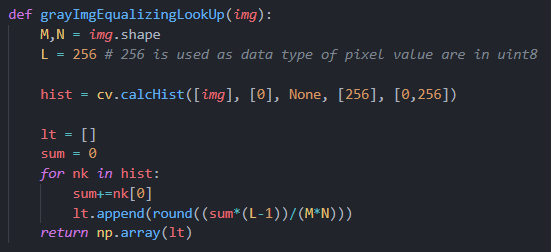
**Question 4**

We can derive pointwise intensity transform for the equalized image using basic probability thermos. The equation of the transform is given bellow.

Text, letter

Description automatically generated(Reference – lecture slides)

A python function can write according to this equation as bellow to return a lookup table for transformation.

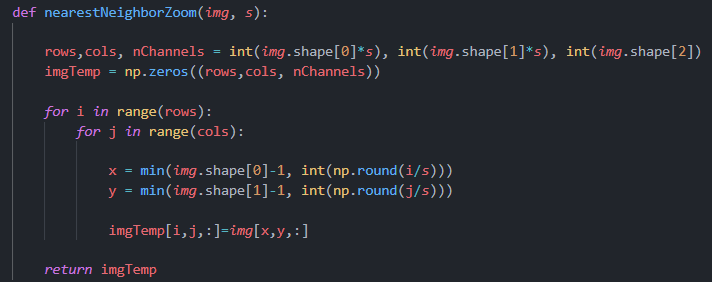


After applying the equalizing transform to a gray scale image, we can observe enhancement of colors as bellow. And the equalized property of colors can significantly observe by comparing original and equalized images histograms. Graphical user interface

Description automatically generated

**Question 5**

In nearest-neighbor zoom method uses pixel values of the nearest position to the corresponding coordinates in the original image to the zoomed image.



To remove the edge problems original image shape is used as a threshold.

In bilinear interpolation method we interpolate pixel values for the exact coordinate using values in the neighbor pixel values.

