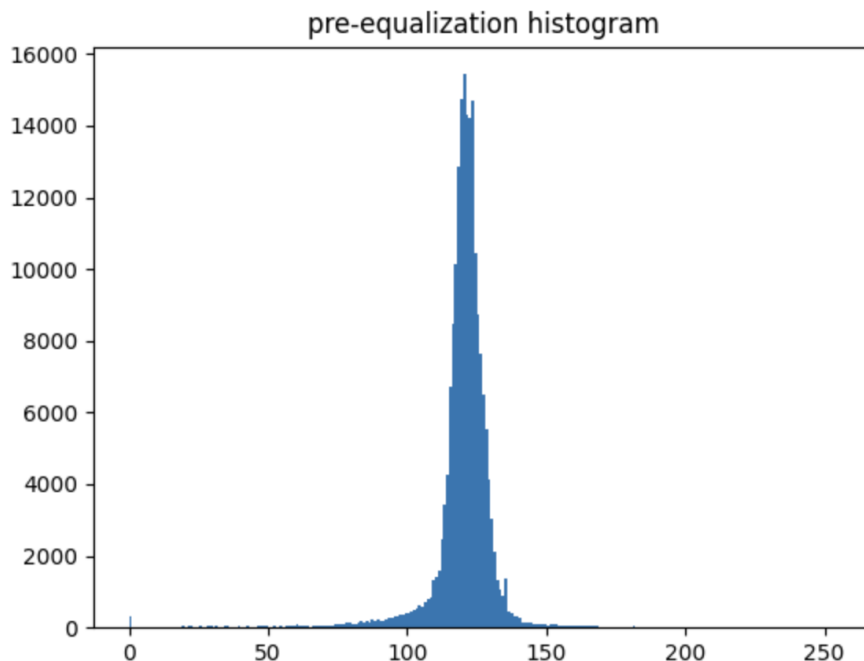


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MP3 Report
Computer Vision
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Task

The task for this MP was to create a function that performs histogram equalization to correct the lighting of a given image. The motivation behind this is that the original image is difficult for the human vision system to process. The reason for this is because the colors used in this image have very minimal difference in darkness. This can be shown in the histogram that maps out the values of the pixels of the image.



As shown in the plot above, the original image has color values concentrated in a small portion of the possible values (between 0 and 255). The idea with histogram equalization is that we want to spread out these groups that have slightly different shades into groups that have differences more easily perceived by the human vision system.

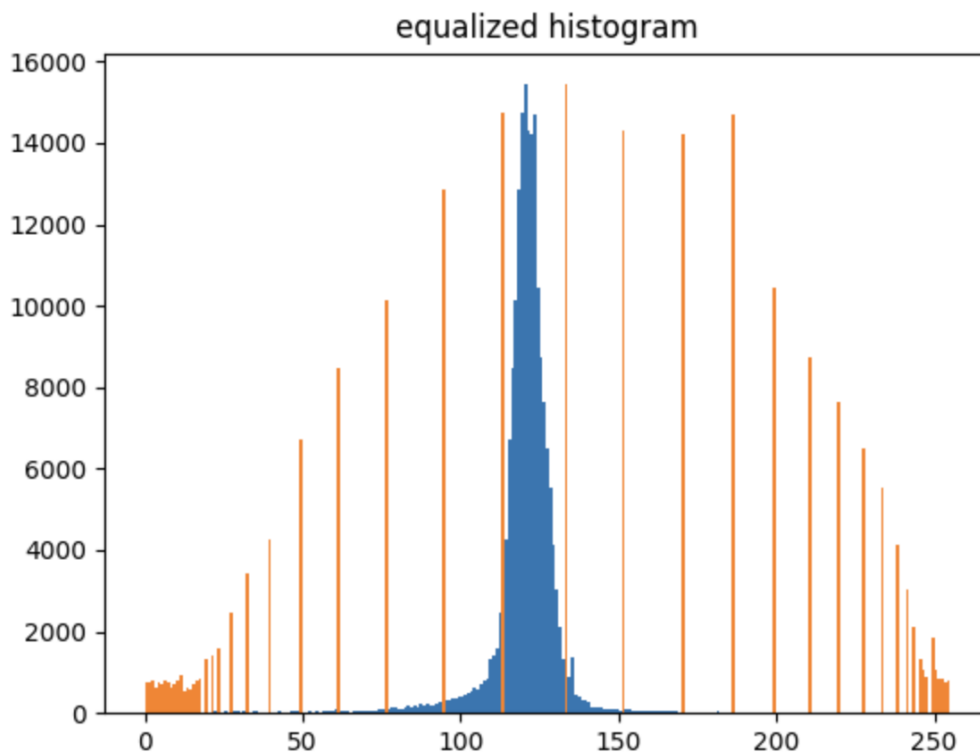
Algorithm

My function does this by mapping the initial distribution onto a wider, more uniform distribution of the intensity values so that they spread across the whole range of possible values. This remapping uses what is called the cumulative distribution function (CDF). The CDF is then normalized to the range of possible values (0, 255). The histogram is then equalized using this normalized CDF by mapping each original pixel value to its corresponding value in the

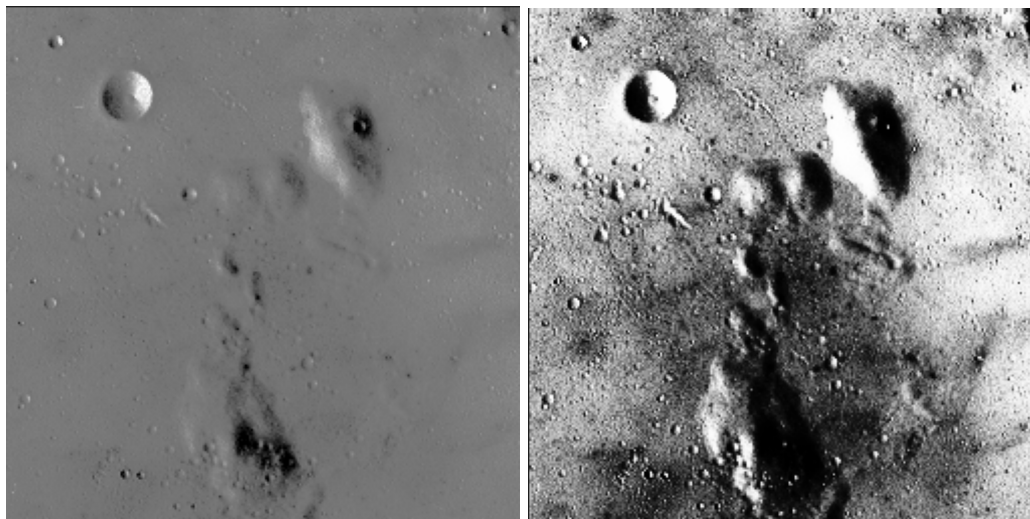
normalized CDF multiplied by the maximum possible pixel value. After getting the equalized histogram, the array is reshaped into the original image dimensions, and the equalized image can be seen.

Results

The equalized histogram looks like this:



As can be seen, the spread of values is much more uniform. This led to a change in the image.



The equalized image is much easier to understand in terms of texture of the pictured image. This is a result of having a larger – and resultingly more visible – difference between differing values.