NUECE 332 - Introduction to Computer Vision
Northwestern University
Fall 2021
Name: Soroush Shahi
NetID: SSF4323
E-Mail: soroush@u.northwestern.edu
GitHub-Repo: https://github.com/faderani/EE_332
GitHub-Name: faderani

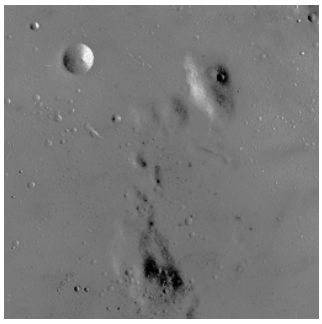
MP#3 - Histogram Equalization

1 Method

The histogram equalization technique will help with contrast adjustment using the image's histogram. In cases where pixel intensities are condensed in a narrow range, this method will help to distribute the histogram evenly over the full range. The implementation of this method is quite easy. We are looking for a transform function that takes the pixel value r to value s in such a way that the ultimate distribution of s becomes even. This function is written as follows:

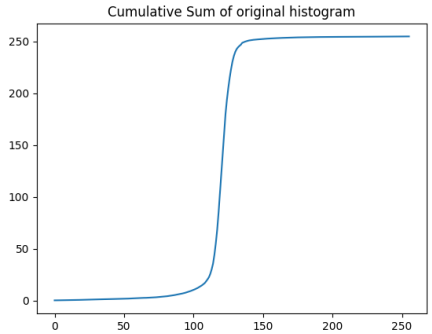
$$S = T(r) = (L-1)\int_0^r P_r(w)dw \tag{1}$$

So basically, we are going to get the cumulative distribution function of the original histogram and replace each pixel by its cumulative value from 0 to that pixel value. Figure 1c shows this function for the example provided in this homework. After that in order to get a value between 0 and 256, the result is multiplied by 255.



(a) Original Image

(b) Effect of histogram equalization



(c) Cumulative Sum Function

Figure 1: Histogram Equalization

2 Results

Figure 1a and Figure 1b shows the original image and the image obtained after histogram equalization. As seen histogram equalization provides a larger intensity range and therefore, reveals more details of the image.