

Cody Nichoson

ECE 332

October 12, 2021

MP#3 - Histogram Equilization

Description of Aglorithm

The purpose of this algorithm is to adjust the contrast of an image with a particularly low level of contrast. First, the test image is imported and flattened to convert it to a 1D array. Then, a histogram of the image's intensity values is created. From this histogram, a cumulative distribution function (CDF) is created using the built-in `cumsum()` function. After adjusting this cdf to fit within the proper bounds, the original flattened image is used to find the corresponding values in the CDF. Upon reshaping this to the shape of the original image, the equalized image is created. The rest of the code is simply plotting the images and calculating an additional histogram and CDF for the equalized image for comparing to the original.

Results and Analysis

The results of the code are displayed in a single multi-plot figure. The top row displays the original image along with its associated histogram and CDF. The bottom row shows the equalized image along with its respective histogram and CDF. Looking at the histograms, it is clear to see that the histogram equalization process has worked as intended due to the more equalized dispersion of the intensity values shown in the second histogram. The CDF plots tell a similar story, as the plot for the equalized image shows a much less aggressive profile than the original. Though an ideally equalized CDF is a perfect linear line, the results shown here are undoubtedly positive. Finally, the two displayed images showcase the practical effect of

histogram equilization. The original image was mostly a similar shade of grey, and many more details are revealed by increasing the images contrast via the histogram equilization method.

