

Introduction to Image Processing HW2

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Method

In this homework, we try to implement histogram equalization and histogram specification(histogram match).

Histogram Equalization:

- First, I've converted the images into grayscale images. Then, I calculate the intensity distribution of each pixel ranging from $0 \sim 255$ and normalize it. Second, I calculate the CDF (cumulative distribution function) based on the histogram distribution we created, and multiply each value by 255. After rounding it to the nearest integer, we obtain new values. Finally, we map the pixel values of the input image to these new values according to the CDF we calculated.

Histogram Specification:

- First, we calculate the histogram intensity of each pixel, CDF, multiplies with 255 and rounded it to obtain the nearest value both on the source image and reference image. Once it's finished, we map the source image to the reference image based on the index of the smallest absolute differentiation of $Reference_{CDF}$ and $Source_{CDF}$ of each pixel. That is, the index we get is what the value of the original pixel should map to.

Result



Figure 1: Histogram Equalization



Figure 2: Histogram Specification

Feedback

After finishing this homework, I've learned the skills to balance pixels with diverse intensities and also learned how to change the histogram to the specific one that we desired.