HW2 Report

110550108 施柏江

1. Method

1.1 Histogram Equalization

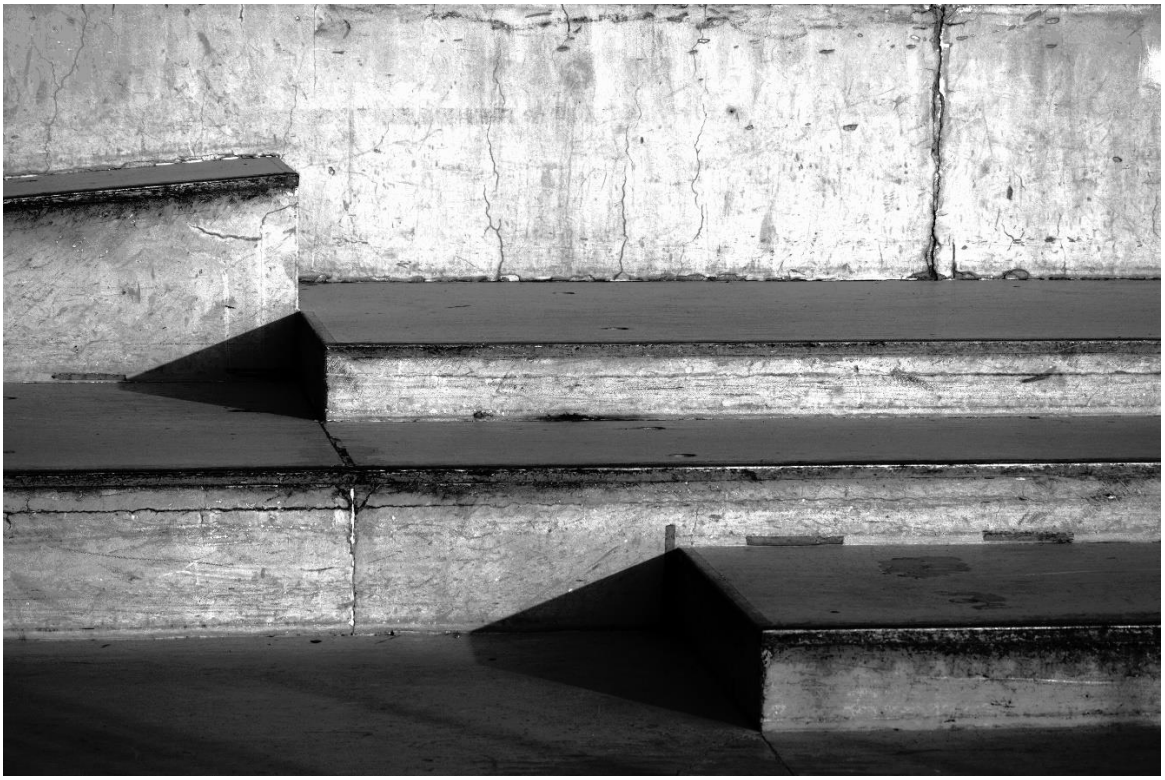
First calculates the probability density function (PDF) of the pixel intensities. After calculating the PDF, normalizes it by dividing each value by the total number of pixels. Then the cumulative distribution function (CDF) is calculated from the PDF. The CDF represents the cumulative sum of probabilities up to each intensity value. The CDF values are normalized by multiplying them by 255. This step scales the CDF values to the range [0, 255] to match the range of pixel intensities. For each pixel, the intensity value is replaced with its corresponding value from the CDF, rounded to the nearest integer. This effectively redistributes the intensity values across the entire dynamic range, enhancing the image contrast.

1.2 Histogram Specification

First calculates the PDF of pixel intensities for both the target image and the reference image. After calculating the PDFs, normalizes them by dividing each value by the total number of pixels in the corresponding image. Then the CDFs is calculated from the PDFs for both the target and reference images. For each intensity value in the target image, finds the corresponding intensity value in the reference image. This is done by finding the index with the minimum absolute difference between the target and reference CDFs. Used a mapping array where each index corresponds to an intensity value in the target image, and the value at that index represents the mapped intensity value from the reference image. Finally, for each pixel in the target image, the intensity value is replaced with its corresponding mapped value from the reference image using the mapping array.

2. Result

2.1 Histogram Equalization



2.2 Histogram Specification

3. Feedback

In this homework, I've learned about histograms and how they can be utilized to adjust the contrast of images. By manipulating the histogram, we can enhance or decrease the contrast of an image, which in turn can improve the effectiveness of subsequent image processing tasks. I hope in the future TAs can provide the portion of screenshots of the results for us to confirm whether what we done is correct.