Xiaowei Yuan

ECE 332

11 October 2022

MP 3 Report

INTRODUCTION

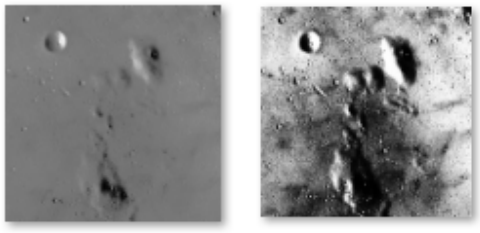
In this MP, I used histogram equalization and 2 methods of lighting correction to increase the global contrast of image ‘Moon’. Originally, ‘Moon’ is represented by a narrow range of color value, after the adjustment, intensities are better distributed.

CONTENTS

Histogram Equalization:

In this function, we first create two array lists to store our color value. In the first list, we go over each pixel of the image and save the color value(between 0-255) to it. And then we use the second array list as a flattened array to save the color value from the first list. In the end, we calculate the updated color value and refill them to the original image, making it more contrasting in color.

Below attacked the original image and the image after histogram equalization.



moon Hist_qual_moon

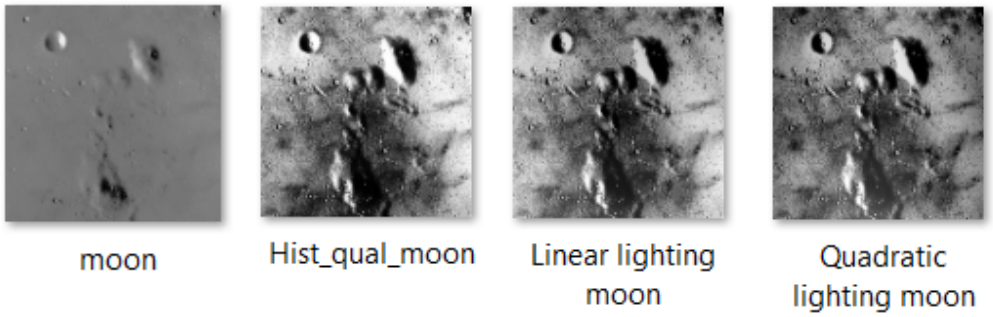
Linear Lighting Correction:

Although we've got the image after histogram equalization, we need to refine it by adding lighting correction. The lighting correction is like adding a mask to the original image, which makes the dark part lighter.

Given the equation of x = (A**t) * y, we need to do a dot product first. Because we use linear as our A, we only need to fill matrix A with x(image axis) and y(image axis). And then we've got a list of updated color values. Go over the original image and refill the updated color values to it.

Quadratic Lighting Correction:

Basically it follows Linear Lighting Correction. The only difference is that it use x[0]*(i**2) + x[1]*i*j + x[2]*(j**2) + x[3]*i + x[4]*j + x[5] to replace x(image axis) and y(image axis) in the dot product. The results look like this.



RESULT ANALYSIS

The histogram equalization makes a large difference on the original image, and linear lighting and quadratic lighting serves as a good addition to it. In this case, I think Quadratic lighting correction performs better than Linear lighting correction. Because in the ‘moon’ image, most of the dark parts gather in the middle line, and quadratic equations happen to be more powerful in the middle line. Since they are matched to each other, the image under quadratic lighting correction is the most clear image.