WS 2019/20	Exercises Digital Image Processing	Task No. 5

simple image processing operations

Task 5.1 *point operations (gray-scale transformation functions)*

a) What is a point operation?

b) Give the transformation functions and the importance of gamma correction operation. Then, write a function to do gamma correction of an image.

c) Given the transformation functions of the range scaling of gray values from intervall $[min, max]$ into intervall $[0, 255]$ as

$$T(r) = 255 \cdot \frac{r - min}{max - min} \tag{1}$$

write a function to apply this operation on an image.

d) Write a program that can perform the point operations from task b) and c). Initially, user selects a point operation. Then the program asks for the parameters required for this operation, and finally calculates the selected operation on an input image.

Task 5.2 *histogram operation*

a) Write a function to calculate histogram of an image.

b) Write a function to print a histogram using (*) symbol on the console.

c) (Extra) write a function to draw a histogram on an image using bar chart.

d) Write a function to do histogram equalization of an image use equation (3.14) in the lecture slides. Display the image before and after equalization.

Tip:

You can use the functions from the last exercise to calculate the minimum and maximum values, or the following DIPLib:

`float max (GrayImage& image)`
: Calculates the maximum gray value of an image `<image>` and returns it as a return value.

`float min (GrayImage& image)`
: Calculates the minimum gray value of an image `<image>` and returns it as a return value.