Assignment 2

Due Date Feb 04, 2024

In this assignment, you explore image histogram, histogram equalization, and histogram matching.

The image histogram of a digital image with intensity levels in the range [0, L-1] is a discrete function $h(r_k) = n_k$, where r_k is the kth intensity value and n_k is the number of pixels in the image with the intensity r_k.

In this assignment, you are required to write the following functions.

1. **CalcHistorgram**: inputs an image and returns its histogram as 256 integer cells.
2. **NormalizeHistogram**: inputs a histogram and image dimension and returns a normalized histogram
3. **EqualizeHistorgram**: inputs an image and its histogram and returns an equalized image of the same dimensions.
4. **MatchHistogram**: inputs two images and copies the histogram distribution of the first image to the second image.

The program should be in Python or C++ and based on OpenCV. It is expected to perform the following:

The program takes five parameters, an operation **H**, **E**, or **M** to indicate histogram, equalize, or match operation, respectively, an input image, and an optional match image and output image. Your program should always display the input image, the computed histogram. For the **E** option, it is required to also display the equalized histogram, and for the **M** option, it is required to display the match histogram and the output image, in addition. The histogram should be displayed as a normalized histogram (graph drawing).

Histogram -H/E/M input [match] [-o] [output]

Notes:
1. You are not allowed to use any function that processes histograms from OpenCV or any other library.
2. It is prohibited to copy any code from the internet.

Grading Key:
1. 70% correctness
2. 20% efficiency
3. 10% clear code

Good luck