Computer Vision Homework #3

系級：資訊四

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Task description:

Implement histogram equalization.

Programming language & toolkit:

1. Python
2. Numpy
3. Matplotlib (for plotting histogram figures)
4. OpenCV (for reading and writing images)

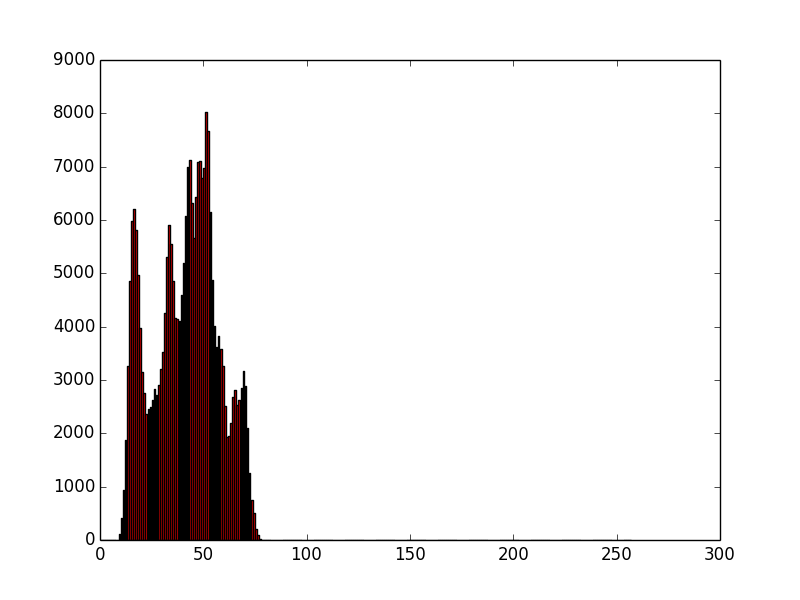
Report:

The task is simple, and the procedures are as follows:

1. As usual, we read in the benchmark image (here we use lena.bmp as an example) by function cv2.imread(…) and store the pixel array in variable named `img`.
2. Although the spec doesn’t mention this, the professor asked us to first divide all pixel values by 3, that is img /= img. Here’s the resulting image `lena\_divided\_3.bmp`:



1. We then compute the pixel value distribution and output the histogram of lena\_divided\_3.bmp, resulting in `histogram-before-equalized.png`:

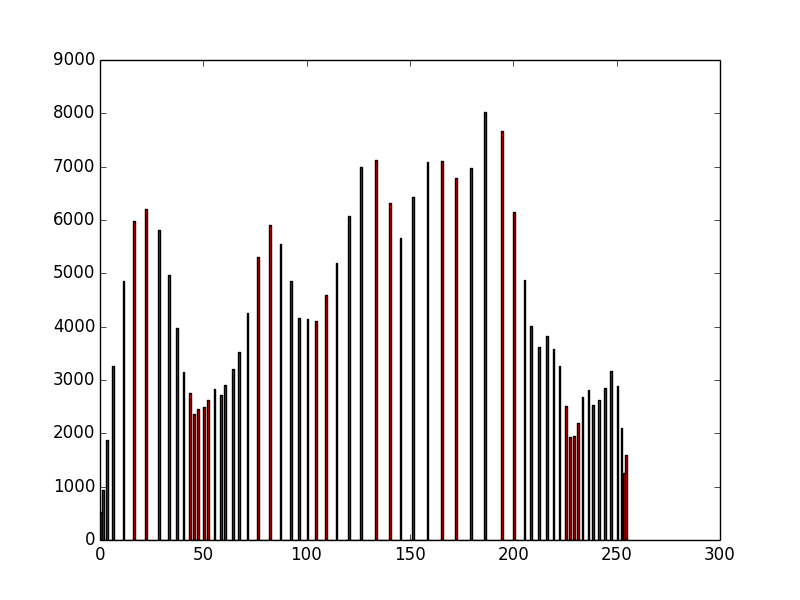


1. Then, we implement histogram equalization. We first calculate :

where is the total number of pixels and denotes the number of pixels with intensity . Then, for each pixel in the image, we replace the original value with , that is, if , then . Here’s the resulting image `lena\_equalized.bmp`:



1. Now let’s compute and output the histogram figure after equalization, which is named after `histogram-after-equalized.png`:



Conclusion:

lena.bmp

lena\_divided\_3.bmp





lena\_equalized.bmp

Result reproduction:

>> python ./main.py # lena.bmp should be put under the same directory.

# The program should output 4 images, which are:

# lena\_divided\_3.bmp, histogram-before-equalized.png,

# lena\_equalized.bmp, and

# histogram-after-equalized.png