# 電腦視覺

# Homework 3

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## Contents:



## Description

This is the report for the third homework for Computer Vision 2019. It is completed in full.

The environment is Windows, with the code (for both parts) being written in Python 3 with the cv2 module. The graphing is done using matplotlib.

## Methodology

(a) Original image and histogram
    1. Each greyscale value is collected and its frequencies are visualized as a graph using matplotlib.

(b) Image with /3 intensity and histogram
    1. Every pixel's intensity is divided by three, then rounded to the nearest integer.
    2. A corresponding histogram is then created.

(c) Histogram equalization and histogram
    1. The method described in the slides is followed, applied to the picture in (b).
    2. A corresponding histogram is then created.

## Code Fragments

### (a) Original image and histogram

```
def get_frequency(image):
    shape = image.shape
    y = [0] * 256
    for i in range(shape[0]):
        for j in range(shape[1]):
            y[int(image[i, j][0])] += 1
    return y
```

```
y_original = get_frequency(image)
histogramize(image, y_original, "B05902100 - HW3 part 1", "part1.png")
```

### (b) Image with /3 intensity and histogram

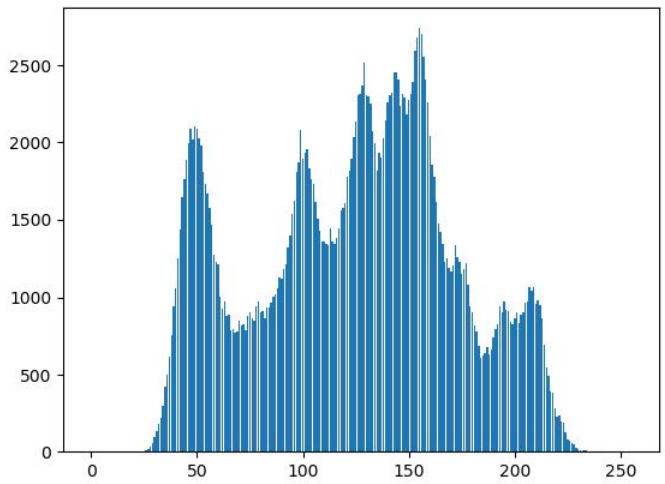
```
three = image.copy()
for i in range(three.shape[0]):
    for j in range(three.shape[1]):
        three[i, j] = [int(three[i, j][0] / 3), int(three[i, j][1] / 3), int(three[i, j][2] / 3)]

y_three = get_frequency(three)
cv2.imwrite("part2.bmp", three)
histogramize(three, y_three, "B05902100 - HW3 part 2", "part2.png")
```

### (c) Histogram equalization and histogram

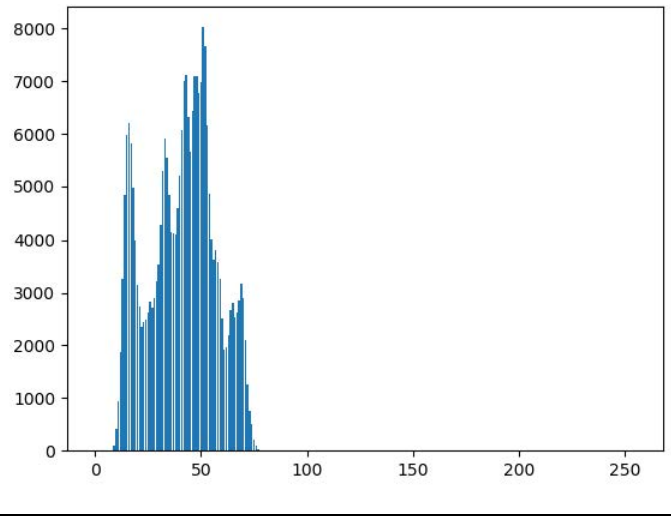
```
S_k = [0] * 256
n = three.shape[0] * three.shape[1]
n_cumulative = np.cumsum(y_three)

imhe = three.copy()
for i, s in enumerate(S_k):
    S_k[i] = 255/n * n_cumulative[i]

for i in range(three.shape[0]):
    for j in range(three.shape[1]):
        imhe[i, j] = [int(S_k[imhe[i, j][0]])] * 3

histy_y = get_frequency(imhe)
cv2.imwrite("part3.bmp", imhe)
histogramize(imhe, histy_y, "B05902100 - HW3 part 3", "part3.png")
```

## Images

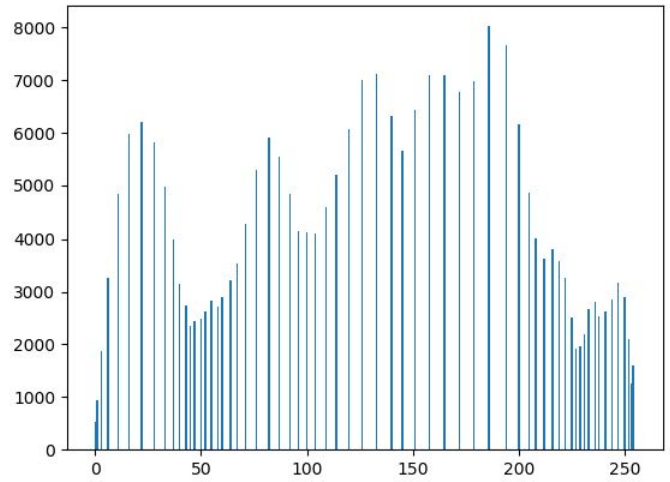
(a) Original image and histogram

| Image | Histogram |
| --- | --- |
|  |   |

(b) Image with /3 intensity and histogram

| Image | Histogram |
| --- | --- |
|  |   |

( c ) Histogram equalization and histogram

| Image | Histogram |
| --- | --- |
|  |  |