

# Computer Vision — Homework 3

B05902118 陳盈如

October 8, 2020

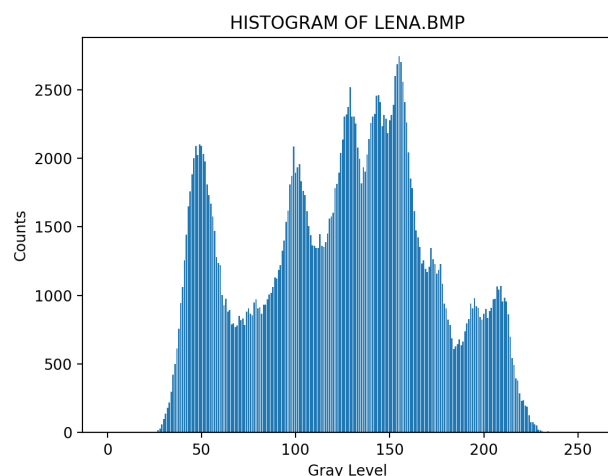
## 1 Original image

```
10 cv2.imwrite('lena.jpg', image)
11
12 histogram = np.zeros(256, int)
13 index = np.arange(256)
14 for i in range(image_rows):
15     for j in range(image_cols):
16         histogram[image[i][j]] += 1
```

Use the same method in hw2 (2) to make a histogram list and just output the image file after reading it.



(a) Image



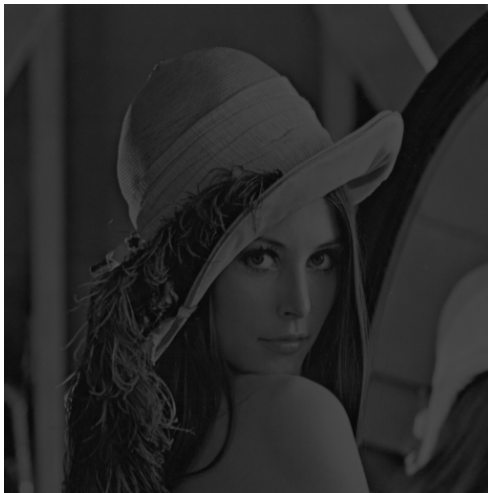
(b) Histogram

Figure 1: Original

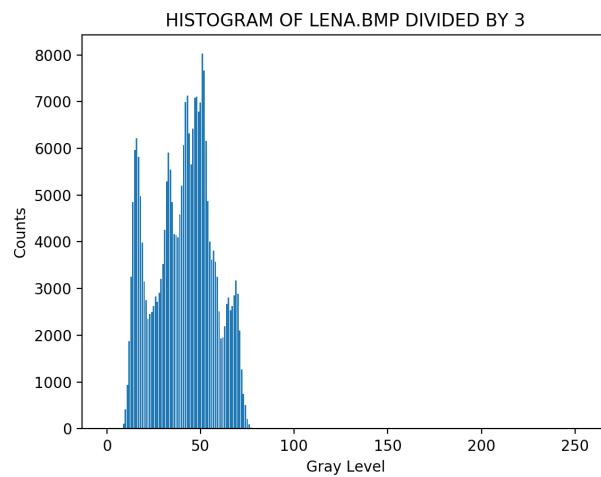
## 2 Image with intensity divided by 3

```
25 div3_his = np.zeros(256, int)
26 div3_img = np.zeros(image.shape, int)
27 for i in range(image_rows):
28     for j in range(image_cols):
29         new_value = int(image[i][j] / 3)
30         div3_img[i][j] = new_value
31         div3_his[new_value] += 1
```

Divide each pixel by 3 and then round the number. Use the same method in (1) to draw a histogram.



(a) Image



(b) Histogram

Figure 2: Divided by 3

### 3 Image after histogram equalization

```
41 eq_img = np.zeros(image.shape, int)
42 new_grayvalue = np.zeros(256, int)
43 MN = image_cols * image_rows
44 for i in range(256):
45     acc = 0
46     for j in range(i + 1):
47         acc += div3_his[j]
48     new_grayvalue[i] = 255 * acc / MN
49 for i in range(image_rows):
50     for j in range(image_cols):
51         eq_img[i][j] = new_grayvalue[div3_img[i][j]]
52
53 eq_his = np.zeros(256, int)
54 for i in range(image_rows):
55     for j in range(image_cols):
56         eq_his[eq_img[i][j]] += 1
```

Implement Histogram Equalization Algorithm as follows.

$$s_k = 255 \times \sum_{j=0}^k \frac{n_j}{n}$$

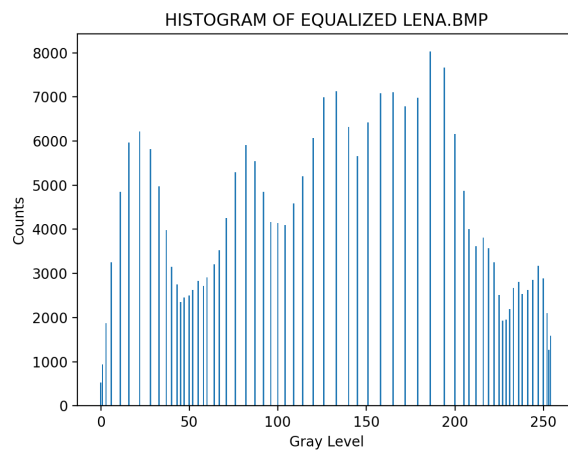
$k = 0$  to  $255$ ,  $n_j$ : number of pixels with intensity  $j$

$n$ : total number of pixels(rows \* cols)

for  $\forall$  pixel, if  $I(im, i, j) = k$  then  $I(imhe, i, j) = s_k$



(a) Image



(b) Histogram

Figure 3: Equalization