HW3
r10944013 網媒所碩一 馮啟倫

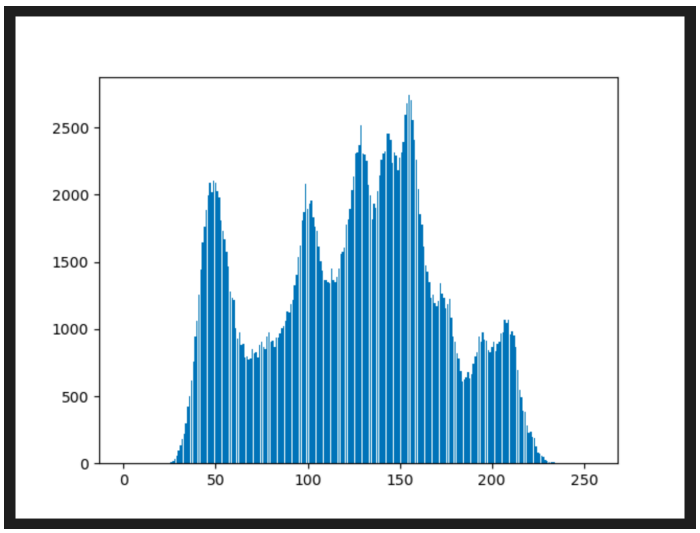
HW3-1:
目標：將照片的像素轉為histogram

演算法：
我先把整個照片做像素的數值統計，得到一個256長度的list，然後根據這個list，使用plt.bar繪製histogram

Code segment

```
img = cv2.imread('lena.bmp', 0) #gray scope
pixel_list = [0 for num in range(256)]
for i in range(img.shape[0]):
    for j in range(img.shape[1]):
        pixel_list[img[i][j]] += 1

plt.bar(range(256), pixel_list)
plt.savefig("hist.png")
```

Result picture:



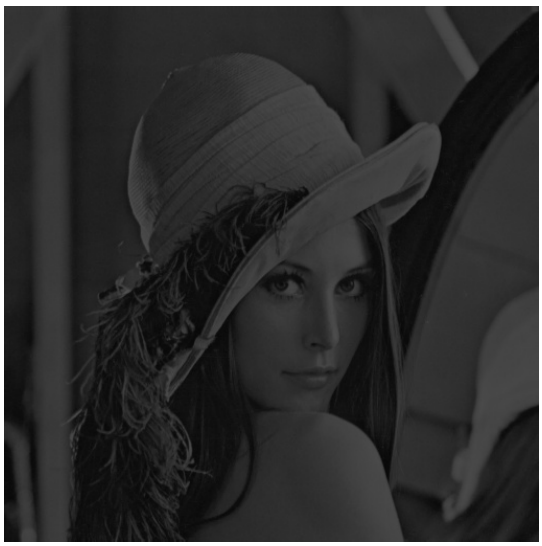
HW3-2:
目標：將照片的亮度變為 1/3

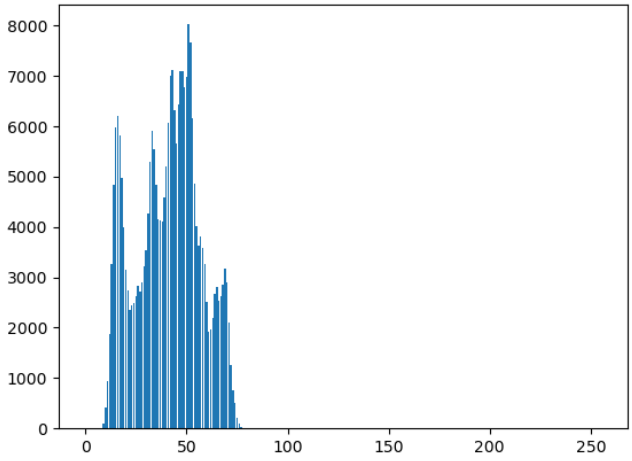
演算法：
對照片的每個像素點都除以三

Code segment:

```
#HW3-2
    img = cv2.imread('lena.bmp', 0) #gray scope
    pixel_list = [0 for num in range(256)]
    for i in range(img.shape[0]):
        for j in range(img.shape[1]):
            img[i][j] //= 3


    cv2.imwrite('img_DivideBy3.jpeg', img)

    pixel_list = [0 for num in range(256)]
    for i in range(img.shape[0]):
        for j in range(img.shape[1]):
            pixel_list[img[i][j]] += 1

    plt.bar(range(256), pixel_list)
    plt.savefig("hist_DiviceBy3.png")
```

Result picture:





HW3-3:

目標：將HW3-2的照片做histogram equalization

演算法：

先得到HW3-2照片的histogram數值，再來每個數值做以下動作：

1. 除以 512*512
2. 乘以255
3. 四捨五入取整數

再來把調整過後的數值list做累加，得到一個新的數值list，再來將這一個數值list做為對照表，將原有照片裡面的數值對照到數值list的數值，即可以完成histogram equalization

Code segment:

```
#先做出直方圖
pixel_list = [0 for num in range(256)]
for i in range(img.shape[0]):
    for j in range(img.shape[1]):
        pixel_list[img[i][j]] += 1

#轉換成機率,乘上最大值並四捨五入,再累加
sum_temp = 0
cdf_list = [0 for num in range(256)]
for i in range(256):
    temp = pixel_list[i]
    temp /= (512*512)
    temp *= 255
    temp = np.round(temp)
    sum_temp += temp
    cdf_list[i] = sum_temp


#根據list作轉換
for i in range(img.shape[0]):
    for j in range(img.shape[1]):
        img[i][j] = cdf_list[img[i][j]]
```

Result picture: