Computer Vision HW2 楊閔喻 R09921012

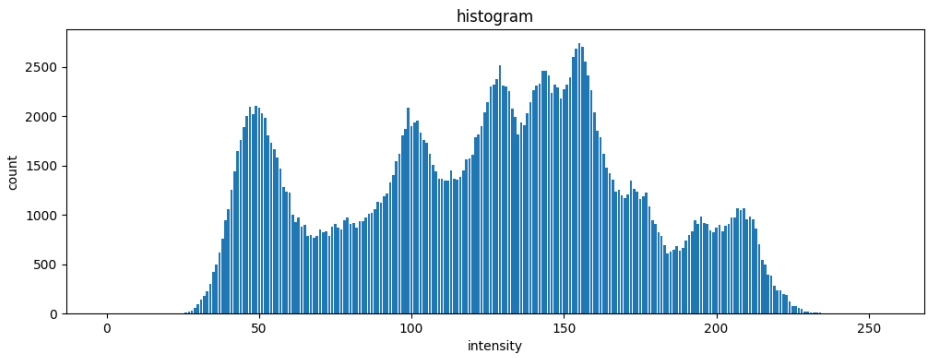
Write a program to generate images and histograms:

(a) original image and its histogram
(b) image with intensity divided by 3 and its histogram
(c) image after applying histogram equalization to (b) and its histogram

(a)

```
for i in range(img.shape[0]):
    for j in range(img.shape[1]):
        (b,g,r) = img[i,j]
        histogram[b,0] = histogram[b,0]+1
        histogram[g,1] = histogram[g,1]+1
        histogram[r,2] = histogram[r,2]+1
```

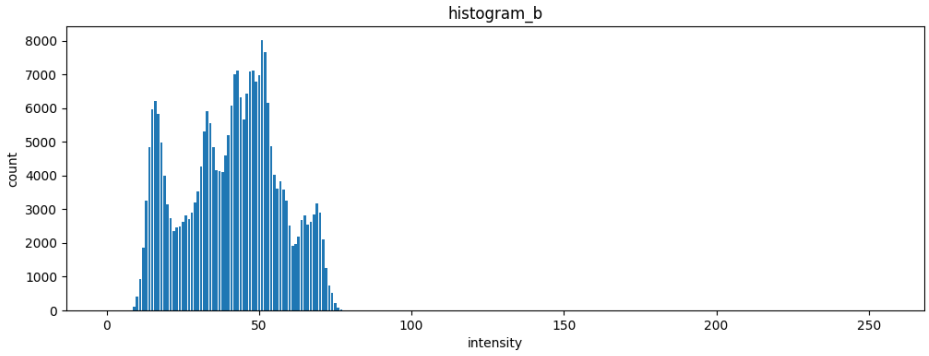
- 走訪每個 pixel，取得其 Intensity Value，紀錄於 histogram 變數中



(b)

```
for i in range(img.shape[0]):
    for j in range(img.shape[1]):
        (b,g,r) = img[i,j]
        b = int(b/3)
        g = int(g/3)
        r = int(r/3)
        img_b[i,j] = (b,g,r)
        histogram_b[b,0] = histogram_b[b,0]+1
        histogram_b[g,1] = histogram_b[g,1]+1
        histogram_b[r,2] = histogram_b[r,2]+1
```

- 走訪原圖每個 pixel，取得其 Intensity Value，將其除以 3 後存入新的圖中，紀錄於 histogram_b 變數中



(c)

```
for i in range(256):
    if i == 0:
        Sk[i,:] = histogram_b[i,:]
    else :
        Sk[i,:] = Sk[i-1,:]+ histogram_b[i,:]
Sk = Sk*255/img.shape[0]/img.shape[1]
```

- 由 histogram equalization 的定義去計算每個不同 intensity 所對應的 Sk

```
for i in range(img.shape[0]):
    for j in range(img.shape[1]):
        (b,g,r) = img_b[i,j]
        b = int(Sk[b,0])
        g = int(Sk[g,1])
        r = int(Sk[r,2])
        img_c[i,j] = (b,g,r)
        histogram_c[b,0] = histogram_c[b,0]+1
        histogram_c[g,1] = histogram_c[g,1]+1
        histogram_c[r,2] = histogram_c[r,2]+1
```

- 將計算好的 Sk 值取代舊有(b)的 intensity，並紀錄於 histogram_c 變數中