Computer Vision I _2018

Homework assignment #3

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Part1 （此次作業僅 one part）

Description:

Write a program to do histogram equalization using

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

$k = 0,1,\ldots,255$

$n_j =$ number of pixels with intensity j

$n =$ total number of pixels

for every pixel if $I(im, I, j) = k$

then $I(imhe, I, j) = sk$

Algorithm:

先將原始圖檔資料記錄在 count 中，計算原始的 histogram 資料，接著利用 count、總 pixels 數 numberofpixels…等計算 equalized 後的 s 陣列，最後再用此陣列繪製 histogram

Parameters:

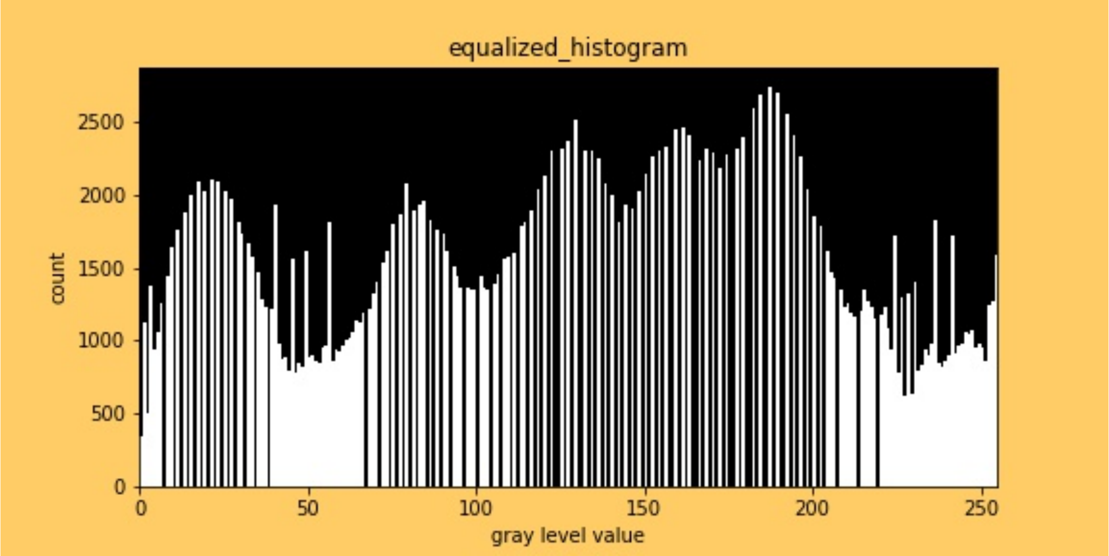
original	#讀取原始圖檔
count	#原始 histogram 資訊
I, j	#迴圈內計數用變數
equalized_histogram	#儲存 equalized 後的圖檔資訊
rows, columns	#計算原始圖檔的行與列數
numberofpixels	#計算原始圖檔的總 pixel 數
s	#equalized 後，與 count 相對應的陣列
summationnow	#計算 s 時迴圈內使用的參數
denominator	#計算 s 時迴圈內使用的參數

Principal code fragment:

```
#histogram equalization
#先new一個空numpy array來接收equalization後的圖，cv2的image可以直接接收numpy array
#算一下equlized後的s陣列，還有總pixels數numberofpixels

equalized_histogram = np.zeros([512,512], int)

#計算s用相關參數
rows, columns = original.shape
numberofpixels = rows * columns
s = np.zeros(256)
summationnow = 0
denominator = 255 / float(numberofpixels)

#計算s
for i in range (256):
    summationnow += count[i]
    s[i] = summationnow * denominator

#把s轉進二階矩陣以便輸出equalized後之lena
for i in range (512):
    for j in range (512):
        equalized_histogram[i, j] = int(round(s[original[i,j]]))

#儲存equalized_lena.jpg
cv2.imwrite("equalized_lena.jpg", equalized_histogram)
```

Resulting images

Equalized 後之 histogram



Equalized 後之 lena