

# Computer Vision HW2

by bo6902034 黃柏諭

## Problem 1

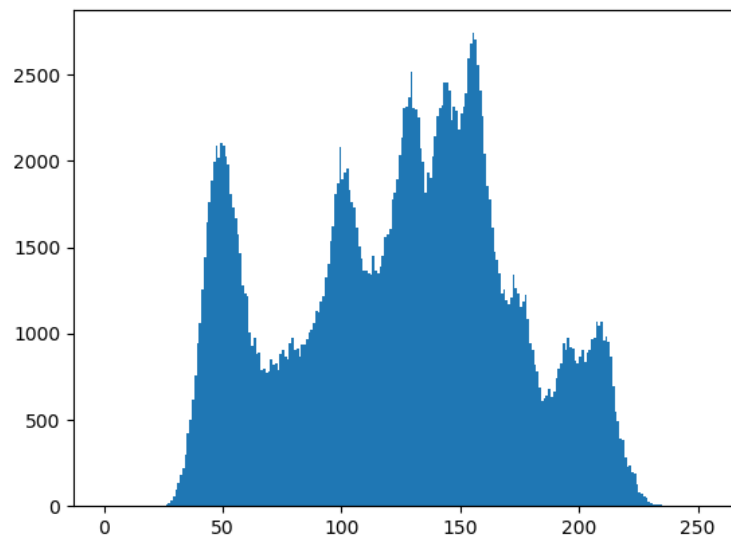
```
import cv2
import numpy as np
import matplotlib.pyplot as plt

image = cv2.imread("lena.bmp")
binary = (image >= 128) * np.full(image.shape, 255)
cv2.imwrite("1_binary lena.bmp", binary)
```



## Problem 2

```
img2D = image[:, :, 0].copy()
plt.hist(img2D.reshape(img2D.size), bins=range(256))
plt.savefig("2_histogram.png")
```



### Problem 3

```

inf = 10000000
L, R, D, U, cnt = 0, 0, 0, 0, 0

def can(row, col):
    return row >= 0 and row < 512 and col >= 0 and col < 512

def dfs(row, col, vis, img):
    global L, R, D, U, cnt
    stack = [(row, col)]
    while stack:
        r, c = stack.pop()
        if can(r, c) and vis[r, c] == 0 and img[r, c] != 0:
            vis[r, c] = 1
            cnt += 1
            L = min(L, c)
            R = max(R, c)
            D = min(D, r)
            U = max(U, r)
            stack += [(r + 1, c), (r - 1, c), (r, c + 1), (r, c - 1)]

vis = np.zeros(img2D.shape)
connected = binary.copy().astype(np.int32)

for r in range(vis.shape[0]):
    for c in range(vis.shape[1]):
        L, R, D, U, cnt = inf, -inf, inf, -inf, 0
        dfs(r, c, vis, binary[:, :, 0])
        if cnt >= 500:
            cv2.rectangle(connected, (L, U), (R, D), (255, 0, 0), 2)
            cv2.circle(connected, (L + R >> 1, U + D >> 1), 5, (0, 0, 255), -1)

cv2.imwrite("3_connected lana.bmp", connected)

```

dfs找出連通塊，檢查大小是否超過500，繪製長方形並用紅色圓形標示中心點。

這裡的連通是指四連通。

