電腦視覺 HW6 report

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Write a program which counts the Yokoi connectivity number on a downsampled image(lena.bmp)

Step1: 二值化

```
# step1: a binary image (threshold at 128)
    for i in range(row):
        for j in range(col):
            np_img[i][j] = 255 if(np_img[i][j] >= 128) else 0
```

Step2: 8-block, 並以最左上進行採樣

```
    # step2: down-sampling from (512, 512) to (64, 64)
    down_size = 64
    new_img = np.zeros((down_size, down_size), np.int)
    step_row = row // down_size
    step_col = col // down_size
    for i in range(0, row, step_row):
        for j in range(0, col, step_col):
            new_i = i // step_row
            new_j = j // step_col
            new_img[new_i][new_j] = np_img[i][j]
```

Step3: 以 4 連通的方式, 構築 Yokoi connectivity number。實作上, 我先將 x0~x8 的判例都先算好, 最後帶入講義算式來完成

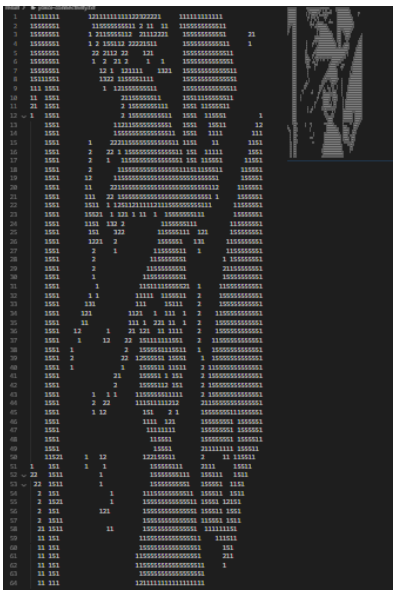
```
 # step3: calculating the Yokoi connectivity number by 4-connected
component
    output = np.zeros((down_size, down_size), dtype=int)
    out_row = output.shape[0]
    out_col = output.shape[1]

    for i in range(out_row):
        for j in range(out_col):
            # x7  x2  x6
            # x3  x0  x1
            # x8  x4  x5
            # use the shape to check the border of image
```

```
            x0 = new_img[i][j]
            x1 = 0 if j == out_col - 1 else new_img[i][j + 1]
            x2 = 0 if i == 0 else new_img[i - 1][j]
            x3 = 0 if j == 0 else new_img[i][j - 1]
            x4 = 0 if i == out_row - 1 else new_img[i + 1][j]
            x5 = 0 if (i == out_row - 1 or j == out_col - 1) else
new_img[i + 1][j + 1]
            x6 = 0 if (i == 0 or j == out_col - 1) else new_img[i - 1][j
+ 1]
            x7 = 0 if (i == 0 or j == 0) else new_img[i - 1][j - 1]
            x8 = 0 if (i == out_row - 1 or j == 0) else new_img[i + 1][j
- 1]
            a = "" # tag of the Yokoi connectivity
            if x0:
                a += h(x0, x1, x6, x2) # a1 = h(x0, x1, x6, x2)
                a += h(x0, x2, x7, x3) # a2 = h(x0, x2, x7, x3)
                a += h(x0, x3, x8, x4) # a3 = h(x0, x3, x8, x4)
                a += h(x0, x4, x5, x1) # a4 = h(x0, x4, x5, x1)
                out = f(a)
            else:
                continue
            output[i][j] = out
```

Step4: 將矩陣，輸出成 txt 檔案 (此部分太簡單省略)

輸出_縮圖版本:



輸出(用小畫家截圖並合併，詳見 txt 檔案):