CV hw6 / 電機所R06921082 陳與賢

Description:

利用python來處理bmp檔,進行**Yokoi Connectivity Number** 讀入hw2的binary圖檔,code如下:

```
66 img_input = Image.open('binary.bmp')
67 pixels_input = img_input.load()
```

Algorithm:

首先要先做downsampling,以8*8的block為unit,採用左上角的pixels值,code如下:

```
0 downsampling = Image.new(img_input.mode, (64, 64))
1 pixels_downsampling = downsampling.load()
2
3 i = j = -1
4 for x in range(0, img_input.width, 8):
5         i += 1
6         j = -1
7         for y in range(0, img_input.height, 8):
8         j += 1
9         pixels_downsampling[i, j] = pixels_input[x, y]
```

downsampling後的圖如下:



接著開始算出Yokoi Connectivity Number,演算法蠻簡單的,首先找出x0~x8(超出邊界就給0),然後算出q跟r的數量,若r的數量為4則回傳5,否則回傳q的數量,code如下:

```
def find_number(x, y):
     x0 = 255
     x1 = x2 = x3 = x4 = x5 = x6 = x7 = x8 = 0
     if x + 1 < 64:
         x1 = pixels_downsampling[x + 1, y]
         x2 = pixels_downsampling[x, y - 1]
     if x - 1 > -1:
         x3 = pixels_downsampling[x - 1, y]
         x4 = pixels_downsampling[x, y + 1]
     if x + 1 < 64 and y + 1 < 64:
         x5 = pixels_downsampling[x + 1, y + 1]
     if x + 1 < 64 and y - 1 > -1:
         x6 = pixels_downsampling[x + 1, y - 1]
     if x - 1 > -1 and y - 1 > -1:
         x7 = pixels_downsampling[x - 1, y - 1]
     if x - 1 > -1 and y + 1 < 64:
         x8 = pixels_downsampling[x - 1, y + 1]
     r_count = 0
     q_count = 0
     if x0 == x1:
         if x2 == 0 or x6 == 0:
            q_count += 1
         else:
            r_count += 1
     if x0 == x2:
            q_count += 1
         else:
             r_count += 1
     if x0 == x3:
         if x4 == 0 or x8 == 0:
             q_count += 1
         else:
         if x0 == x4:
              if x1 == 0 or x5 == 0:
                    q_count += 1
6
              else:
7
                    r_count += 1
8
9
        if r_count == 4:
0
              return 5
        else:
2
              return q_count
```

最後是結果,由於助教的上課ppt沒有把0印出來(isolated label),但我個人覺得isolated label的0值應該要印出來,因為他跟pixel值為0不一樣,所以我這邊附上有印出isolated label跟沒有isolated label的答案。

不印出isolated label:

```
15555551
                                                    21
15555551
15555551
15555551
15555551
15111551
111 1551
11 1551
21 1551
   1551
   1551
   1551
   1551
   1551
   1551
   1551
   1551
   1551
   1551
1551
1551
1551
   1551
   1551
   1551
   1551
1551
1551
   1551
   155
   11521
    1511
    15
    1511
                        22
    151
                        12111111111111111111
```

印出isolated label:

```
11111111
15555551
15555551
                                                                                0
                                                                                                                          0
                                                                                                                      21
15555551
                                                                                                                    0
15555551
                                                                                  15555555555511
15555551
                                                                                  15555555555551
                                                                                                                 0
                                                                                  15555551
15555551
15111551
111 1551
11 1551
21 1551
                                      12
111
1151
1551
        1551
                           15555

2 2211555555

2 1 115555555555555115115551

2 115555555555555551155115551

2 1255555555555555555551

11 0 221555555555555555555551

12 12 1255555555555555555551

13 1 2 215555555555555555551

1551 1 121 1 11 1 155555111 0

151 1 122 1 11 1 155555111 0

151 0 322 115555511 121

1221 2 15555511 121

2 0 1 115555551 131

2 0 0 115555551 1

2 0 1 115555551 1

1 0 115555551 1

1 0 115555551 1

1 0 1155555551 1

1 0 1155555551 1
        1551
1551
1551
                                                                                                                    11551
        1551
                                                                                                           1551
        1551
        1551
1551
1551
1551
        1551
        1551
                                                                                                            155555551
                                                                                                       155555551
1155555551
1155555551
1 155555551
21155555551
        1551
        1551
1551
1551
                                                                                         1551
                                               1551
        1551
                           131 0
        1551
        1551
        1551
                      12
                               0
                                      12
        1551
                    2
                                       0 22
        1551
        1551
                               0
        1551
1551
1551
                                       21
2
1 1
22
                           0 0
                                2
        1551
                                                        111511111212
        1551
                                    120
                                                           151111212
151 2 1
1111 121
11111111
115551
15551
                                                                                            2115858585858585851
1585858581 1885851
1585858581 1885851
158585851 1885851
211111111 188511
2 11 118511
2 11 118511
        1551
                  0
                                 2
        1551
                             0
                                   0
       1551
1551
1551
1551
                                       0
                              0
                                     12
                             2
                                                            151 0
                                                                                            2:11 155
15511 151
155551 151
15551 151
15551 1551
15551 1551
                                     1
                             1
22
                                                                                                              1511
 22
          1511
                                     1
                                 0 1
          1521
                                0 11
          1511
                                                                                              111111151
    21
          1511
    11
                                                      111511
151
211
          151
          151
                               0
    22
          151
                                                        1211111111111111111
                              0
```