

Computer Vision_HW6

- Command Line

python main.py yokoi

- Yokoi Connectivity Number

1. Binarize (threshold as 128)

```
img_bin = np.zeros(img.shape, np.int)
for y in range(img.shape[0]):
    for x in range(img.shape[1]):
        if img[y][x] >= 128:
            img_bin[y][x] = 255
```

2. Downsample to 64*64

```
img_ds = np.zeros((64,64), np.int)
for y in range(img_ds.shape[0]):
    for x in range(img_ds.shape[1]):
        img_ds[y][x] = img_bin[8*y][8*x]
```

3. Assign 9*9 mask (below are part of algorithm)

```
for y in range(img_ds.shape[0]):
    for x in range(img_ds.shape[1]):
        if img_ds[y][x] == 255:
            if y == 0:
                if x == 0:
                    x7, x2, x6 = 0, 0, 0
                    x3, x0, x1 = 0, img_ds[y][x], img_ds[y][x+1]
                    x8, x4, x5 = 0, img_ds[y+1][x], img_ds[y+1][x+1]
                elif x == img_ds.shape[1]-1:
                    x7, x2, x6 = 0, 0, 0
                    x3, x0, x1 = img_ds[y][x-1], img_ds[y][x], 0
                    x8, x4, x5 = img_ds[y+1][x-1], img_ds[y+1][x], 0
            else:
                x7, x2, x6 = 0, 0, 0
                x3, x0, x1 = img_ds[y][x-1], img_ds[y][x], img_ds[y][x+1]
                x8, x4, x5 = img_ds[y+1][x-1], img_ds[y+1][x], img_ds[y+1][x+1]
```

4. Run yokoi function

```
def yokoi_function(b,c,d,e):
    if b == c and (d != b or e != b):
        return 'q'
    elif b == c and (d == b and e == b):
        return 'r'
    elif b != c:
        return 's'
```

```

a1 = yokoi_function(x0, x1, x6, x2)
a2 = yokoi_function(x0, x2, x7, x3)
a3 = yokoi_function(x0, x3, x8, x4)
a4 = yokoi_function(x0, x4, x5, x1)

if a1 == a2 == a3 == a4 == 'r':
    ans[y][x] = 5
else:
    ans[y][x] = 0
    for a in [a1, a2, a3, a4]:
        if a == 'q':
            ans[y][x] += 1

```

5. Output to txt

```

answer = yokoi(img)
with open('yokoi.txt', 'w') as f:
    for y in range(64):
        for x in range(64):
            f.write(str(answer[y][x]))
        f.write('\n')

```

- Result

```
111111111 12111111111122322221 11111111111111 0 0
15555551 115555555511 2 11 11 115555555511 0
15555551 1 2115555112 21112221 15555555551 21
15555551 1 2 155112 22221511 155555555511 1
15555551 22 2112 22 121 0 0 1555555555511 0
15555551 1 2 21 2 1 1 1555555555551 0
15555551 12 1 121111 1321 15555555555511
15111551 1322 1155551111 15555555555551
111 1551 1 121555555511 155555555555511
11 1551 21155555511 1551115555511
21 1551 2 15555555111 1551 11555511
1 1551 2 15555555511 1551 115551 1
1551 112115555555551 1551 15511 12
1551 1555555555555511 1551 1111 111
1551 22211555555555511 1151 11 1151
1551 2 22 1 1555555555555511 151 11111 1551
1551 2 1 1155555555555551 151 115551 11551
1551 2 1155555555555555111511155511 115551
1551 12 1155555555555555555555555551 155551
1551 11 0 221555555555555555555555555112 1155551
1551 111 22 1555555555555555555555555551 1 1555551
1551 1511 1 125112111112111555555555111 1155551
1551 15521 1 121 1 11 1 15555555111 0 1555551
1551 1151 132 2 1155555111 0 11555551
1551 151 0 322 115555111 121 15555551
1551 1221 2 1555551 131 115555551
1551 2 0 1 115555511 1 115555551
1551 2 0 0 1155555551 0 1 155555551
1551 2 11555555551 21155555551
1551 1 0 11555555551 1555555551
1551 1 11511115555521 1 11555555551
1551 1 1 11111 1155511 2 15555555551
1551 131 111 15111 2 15555555551
1551 121 0 1121 1 111 1 2 115555555551
1551 11 111 1 221 11 1 2 155555555551
1551 12 0 1 21 121 11 1111 2 155555555551
1551 1 12 22 151111111551 2 1155555555551
1551 1 2 155551115511 1 1555555555551
1551 2 0 0 22 1255551 15551 1 1555555555551
1551 1 1555511 11511 2 11555555555551
1551 0 0 21 155551 1 151 2 15555555555551
1551 15555112 151 2 15555555555551
1551 1 1 1 1155555511111 2 15555555555551
1551 2 22 111511111212 2115555555555551
1551 0 1 12 151 2 1 1555555511155551
1551 0 0 0 1111 121 15555551 155551
1551 0 11111111 15555551 1555551
1551 0 115551 15555551 1555511
1551 15551 211111111 155511
11521 1 12 122155511 2 11 115511
1 151 0 1 1 155555111 2111 15511
22 1511 1 15555555111 155111 1511
22 1511 1 15555555551 155551 1151
2 151 0 1 11155555555511 155511 1511
2 1521 155555555555511 15551 12151
2 151 155555555555551 155511 1551
2 1511 155555555555551 115551 1511
21 1511 11 155555555555551 111111151
11 151 1155555555555551 111511
11 151 1555555555555551 151
11 151 0 11555555555555551 211
11 151 11555555555555551 1
11 151 0 15555555555555551
11 111 0 12111111111111111111
```