HW6
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HW6:

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

演算法：

1. Downsample圖片成64*64
2. 先做padding，上下左右都pad一格
3. 用4聯通的方式，去計算Yokoi connectivity number(去檢查當前pixel的四個方向，依照Yokoi的規則給予q, r, s的標籤，再把四個標籤所對應的分數計算出來)

Code segment

#downsample

```
#down sample
img_downsample = np.zeros((64,64))
for row in range(img_downsample.shape[0]):
    for col in range(img_downsample.shape[1]):
        img_downsample[row][col] = img_binary[8*row][8*col]
```

#yokoi計算

```
def cal_score(x0,x1,x2,x3,x4,x5,x6,x7,x8):
    condition = []
    #first dimension
    if x1==x0:
        if x2==x0 and x6==x0:
            condition.append("r")
        else:
            condition.append("q")
    else:
        condition.append("s")

    #second dimension
    if x2==x0:
        if x7==x0 and x3==x0:
            condition.append("r")
        else:
            condition.append("q")
    else:
        condition.append("s")

    #third dimension
    if x3==x0:
        if x8==x0 and x4==x0:
            condition.append("r")
        else:
            condition.append("q")
    else:
        condition.append("s")

    #third dimension
    if x4==x0:
        if x1==x0 and x5==x0:
            condition.append("r")
        else:
            condition.append("q")
    else:
        condition.append("s")

    #third dimension
    if x4==x0:
        if x1==x0 and x5==x0:
            condition.append("r")
        else:
            condition.append("q")
    else:
        condition.append("s")

    #Check for q and r
    if condition.count("r") == 4:
        return 5
    else:
        return condition.count("q")
```

```
img_yokoi = np.zeros((64,64))
for row in range(img_downsample.shape[0]):
    for col in range(img_downsample.shape[1]):
        center_row = row+1
        center_col = col+1
        x0 = img_pad[center_row][center_col]
        x1 = img_pad[center_row][center_col+1]
        x2 = img_pad[center_row-1][center_col]
        x3 = img_pad[center_row][center_col-1]
        x4 = img_pad[center_row+1][center_col]
        x5 = img_pad[center_row+1][center_col+1]
        x6 = img_pad[center_row-1][center_col+1]
        x7 = img_pad[center_row-1][center_col-1]
        x8 = img_pad[center_row+1][center_col-1]
        if x0 != 0:
            score = cal_score(x0,x1,x2,x3,x4,x5,x6,x7,x8)
            img_yokoi[row][col] = score
```

Result picture: