Computer Vision HW4

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1. Result

1.dilation

2.erosion

3.opening

4.closing

5.hit and miss transform

# 2. principle code and algorithm

using 3-5-5-5-3 kernel

1. dilation

```
dila = []
for i in range (len(bin)+4):
    dila.append([])
    for j in range (len(bin)+4):
        dila[i].append(0)

for i in range (2,len(bin)+2):
    for j in range (2,len(bin)+2):
        if(bin[i-2][j-2]==1 ):
            iteration=0
            for ii in range (i-2,i+3):
                for jj in range (j-2,j+3):
                    if(iteration!=0 and iteration!=4 and iteration!=20 and iteration!=24 ):
                        dila[ii][jj]=1
                    iteration+=1
for i in range (2,len(bin)+2):
    for j in range (2,len(bin)+2):
        if(dila[i][j]==1):
            img[i-2][j-2][0]=255
            img[i-2][j-2][1]=255
            img[i-2][j-2][2]=255
        else:
            img[i-2][j-2][0]=0
            img[i-2][j-2][1]=0
            img[i-2][j-2][2]=0
```

2. erosion

```
ero = []
for i in range (len(bin)):
    ero.append([])
    for j in range(len(bin[0])):
        ero[i].append(0)

for i in range (2,len(bin)+2):
    for j in range (2,len(bin)+2):
        iteration=0
        num=0
        for k in range (i-2,i+3):
            for l in range (j-2,j+3):
                if(iteration!=0 and iteration!=4 and iteration!=20 and iteration!=24 ):
                    if(img_expand[k][l]==1):
                        num+=1
                iteration+=1
        if(num>=21):
            ero[i-2][j-2]=1
for i in range (len(bin)):
    for j in range (len(bin)):
        if(ero[i][j]==1):
            img[i][j][0]=255
            img[i][j][1]=255
            img[i][j][2]=255
        else:
            img[i][j][0]=0
            img[i][j][1]=0
            img[i][j][2]=0
```

3. opening and closing 使用 dilation 加上 erosion 即可生成

```
##create dilation erosion closing and open
img = cv2.imread("lena.bmp")
img_bin=binarize(img)
cv2.imwrite("b.jpg",img)
dilation (img_bin,img)
cv2.imwrite("dilation.jpg",img)
img_bin=binarize(img)
erosion(img_bin,img)
cv2.imwrite("closeing.jpg",img)
img = cv2.imread("lena.bmp")
img_bin=binarize(img)
erosion(img_bin,img)
cv2.imwrite("erosion.jpg",img)
img_bin=binarize(img)
dilation (img_bin,img)
cv2.imwrite("opening.jpg",img)
```

4.hit and miss transform

```
##A with J
for i in range (len(A)-1):
    for j in range (1,len(A)):
        if(bin[i+1][j]==1 and bin[i][j]==1 and bin[i][j-1]==1):
            A[i][j]=1
##A with K
for i in range (1,len(A)):
    for j in range (1,len(A)-1):
        if(inv_bin[i-1][j]==1 and inv_bin[i-1][j+1]==1 and inv_bin[i][j+1]==1):
            inv_A[i][j]=1

for i in range (len(bin)):
    for j in range (len(bin)):
        if(inv_A[i][j]==1 and A[i][j]==1):
            img[i][j][0]=255
            img[i][j][1]=255
            img[i][j][2]=255
        else:
            img[i][j][0]=0
            img[i][j][1]=0
            img[i][j][2]=0
```