**Computer Vision HW1**

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1. **Principle Code and method**

**Part 1:**

Change original to binary image and choose topmost-left pixel as the down-sampled data.

**Code:**

def binarize (img):

blank\_image = np.zeros((len(img),len(img[0]),3), np.uint8)

for i in range (len(img)):

for j in range (len(img[0])):

if(img[i][j][0]>=128):

blank\_image[i][j][0]=255

blank\_image[i][j][1]=255

blank\_image[i][j][2]=255

else:

blank\_image[i][j][0]=0

blank\_image[i][j][1]=0

blank\_image[i][j][2]=0

return blank\_image

def down\_sample (img):

blank\_image = np.zeros((64,64,3), np.uint8)

index\_i = 0

index\_j = 0

for i in range (0,512,8):

for j in range (0,512,8):

#print(i,j,index\_i,index\_j)

blank\_image[index\_i][index\_j][0]=img[i][j][0]

blank\_image[index\_i][index\_j][1]=img[i][j][0]

blank\_image[index\_i][index\_j][2]=img[i][j][0]

index\_j+=1

index\_j=0

index\_i+=1

return blank\_image

**Part 2:**

Use method from slide (CV1\_CH6\_2018 ,pp.60-63) to find Yokoi Connectivity Number.

**Code**:

def yokoi\_4connected (img):

exp\_img = expand(img,1)

yokoi\_matrix = np.zeros((len(img),len(img[0])), np.uint8)

f\_array = ["s","s","s","s"]

for i in range (1,len(img)+1):

for j in range (1,len(img[0])+1):

if(exp\_img[i][j][0]==0):

yokoi\_matrix[i-1][j-1]=6

else:

yokoi\_matrix[i-1][j-1]=f\_func(exp\_img,i,j)

return yokoi\_matrix

def f\_func(img,i,j):

f\_array = ["a","a","a","a"]

f\_array[0]=h\_func(img[i][j][0],img[i][j+1][0],img[i-1][j+1][0],img[i-1][j][0])

f\_array[1]=h\_func(img[i][j][0],img[i-1][j][0],img[i-1][j-1][0],img[i][j-1][0])

f\_array[2]=h\_func(img[i][j][0],img[i][j-1][0],img[i+1][j-1][0],img[i+1][j][0])

f\_array[3]=h\_func(img[i][j][0],img[i+1][j][0],img[i+1][j+1][0],img[i][j+1][0])

if (f\_array[0]=="r" and f\_array[1]=="r" and f\_array[2]=="r" and f\_array[3]=="r"):

return 5

else:

num = 0

for i in range (4):

if(f\_array[i]=="q"):

num+=1

return num

def h\_func (b,c,d,e):

if(b==c):

if(d!=b or e!=b):

return "q"

elif(d==b and e==b):

return "r"

return "s"

**Part3:**

main and create txt

**Code:**

img = cv2.imread(sys.argv[1])

b\_img = binarize(img)

ds\_b\_img = down\_sample (b\_img)

yokoi\_matrix = yokoi\_4connected(ds\_b\_img)

text\_file = open("yokoi\_matrix.txt", "w")

for i in range (len(yokoi\_matrix)):

for j in range (len(yokoi\_matrix[0])):

if(yokoi\_matrix[i][j]==6):

text\_file.write(" ")

else:

text\_file.write(str(yokoi\_matrix[i][j]))

text\_file.write("\n" )

text\_file.close()

**2. Result :**

**part1:binary image and down sample image**



**Part 2 :yokoi matrix**

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