Computer Vision I \_2018

Homework assignment #2

R07522717 機械所製造組碩一 林温雅

#使用python

#import套件

%matplotlib inline

import matplotlib.pyplot as plt

from PIL import Image

import numpy as np

#讀取lena.bmp

im = Image.open("lena.bmp") #讀取原始圖檔

#先儲存原始資訊

original = np.zeros([512,512],np.int ) #儲存原始圖檔pixels之value

binary = np.zeros([512,512],np.int ) #儲存binary圖檔pixels之value

count = np.zeros(256, np.int)

#讀取原始資料到一個2D-array

for i in range (512):

for j in range (512):

original[i, j] = im.getpixel((i,j))

count[original[i, j]] += 1

im\_binary = Image.new("L", (512,512), 0)

for i in range (512):

for j in range (512):

if original[i,j] > 127:

#binarize lena.bmp

im\_binary.putpixel((i,j), 255)

#預備第三題所需之矩陣

binary[i,j] = 1

#儲存binarized lene.bmp

im\_binary.save("im\_binary.bmp")

#作histogram的圖

x = np.linspace(0,255,256, endpoint = True, dtype=np.int)

y = count[x]

ax = plt.figure(figsize=(8,4))

ax.set\_facecolor((1, 0.8, 0.4))

plt.axes(facecolor='k')

plt.hist(original.flatten(), bins = x, density=False, color='w')

plt.xlabel("gray level value")

plt.ylabel("count")

plt.title("Histogram of lena.bmp")

plt.xlim(0, 255)

plt.ylim(0, max(count))

#儲存histogram的圖

ax.savefig("histogram.png",facecolor=ax.get\_facecolor(), edgecolor='none')

#下面開始第三題

label1=0

anythingchange = True

loops = 0

#binary已經是initialize過的512\*512 matrix了

#先把每個pixel全部標上不同的數字

for i in range (512):

for j in range (512):

if binary[i,j] != 0:

label1 += 1

#此時label1是total非0之pixels數

binary[i,j] = label1

#使用iteration之方式

while (anythingchange == True):

#接著topdown

#先左到右

anythingchange = False

for i in range (0,512):

for j in range (1,512):

if binary[i,j] \* binary[i,j-1] != 0 and binary[i,j-1] < binary[i,j]:

binary[i,j] = binary[i,j-1]

anythingchange = True

#再上到下

for j in range (0,512):

for i in range (1,512):

if binary[i,j] \* binary[i-1,j] != 0 and binary[i-1,j] < binary[i,j]:

binary[i,j] = binary[i-1,j]

anythingchange = True

#接著bottomup

#先右到左

for i in range (0,512):

for j in range (510, -1, -1):

if binary[i,j] \* binary[i,j+1] != 0 and binary[i,j+1] < binary[i,j]:

binary[i,j] = binary[i,j+1]

anythingchange = True

#再下到上

for j in range (0,512):

for i in range (510, -1, -1):

if binary[i,j] \* binary[i+1,j] != 0 and binary[i+1,j] < binary[i,j]:

binary[i,j] = binary[i+1,j]

anythingchange = True

loops += 1

#計算有哪些是>500個pixels的群體

pixelcount = np.zeros(133960, np.int)

area = np.zeros(0, np.int)

for i in range (512):

for j in range (512):

if binary[i,j] != 0:

pixelcount[binary[i,j]] += 1

#找出pixel數大於500之區塊

for i in range (133960):

if pixelcount[i] > 500:

area = np.append(area, i)

#繪製矩形

from PIL import ImageDraw

boundary = np.zeros([np.size(area), 4],np.int )

connected\_component = im\_binary.convert('RGB')

draw = ImageDraw.Draw(connected\_component)

for k in range(np.size(area)):

minx, miny, maxx, maxy = 600, 600, 0, 0

for i in range (512):

for j in range (512):

if binary[i,j] == area[k]:

if i < minx:

minx = i

elif i > maxx:

maxx = i

if j < miny:

miny = j

elif j > maxy:

maxy = j

draw.rectangle([minx, miny, maxx, maxy],fill=None, outline="red")

#儲存connected\_component之圖片

connected\_component.save("connected\_component.bmp")