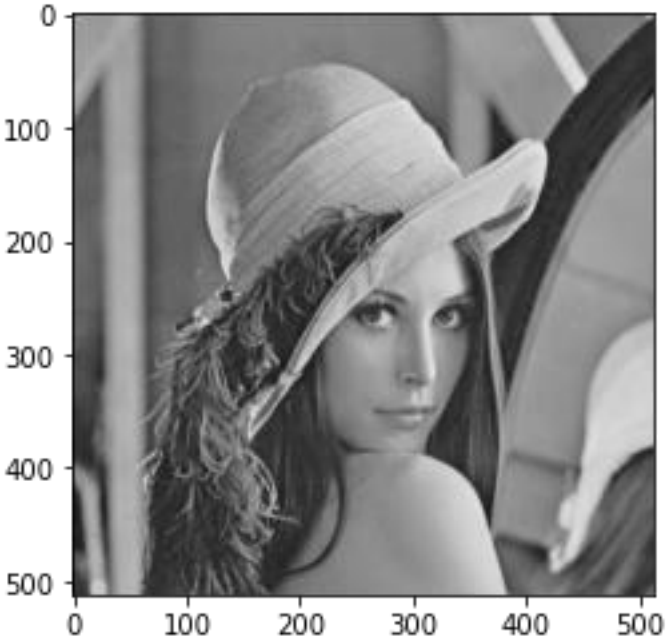
電腦視覺 hw6 資工所碩一 R09922127 林聖哲

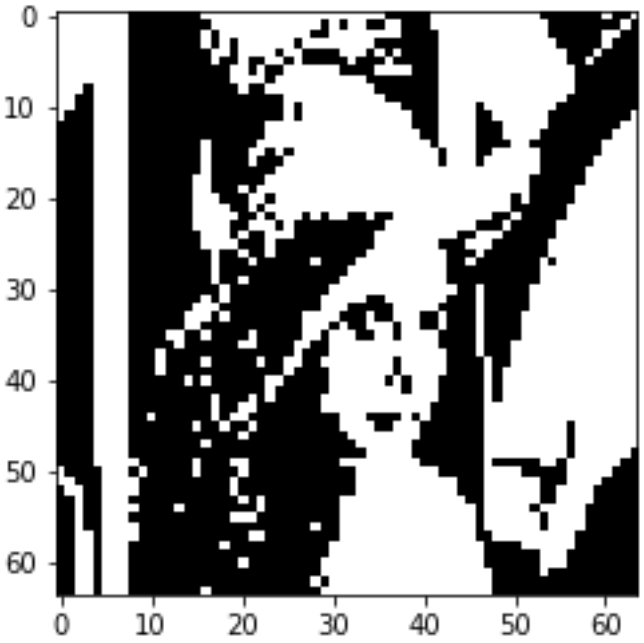
Python 版本 3.6.12
使用套件 cv2, numpy, matplotlib

First, read the bmp file



Write a program which does thinning on a downsampled image (lena.bmp).

Step1: Binarize the benchmark image lena, then using 8x8 blocks as a unit, take the topmost-left pixel as the downsampled data.



Step2: Creat marked image : Count the Yokoi connectivity number on a downsampled lena using 4-connected, and then use the pair relation operator

Formula:

Yokoi connectivity:

- for 4-connectivity

$$h(b,c,d,e)=\begin{cases} q & if\ b=c\ and\ (d\neq b\ \vee e\neq b) \\ r & if\ b=c\ and\ (d=b\wedge e=b) \\ s & if\ b\neq c \end{cases}$$

$$f(a_1,a_2,a_3,a_4)=\begin{cases} 5 & if\ a_1=a_2=a_3=a_4=r \\ n & where\ n=numberof\{a_k|a_k=q\}, otherwise \end{cases}$$

Pair Relationship Operator:

$$h(a,i)=\begin{cases} 1 & if\ a=i \\ 0 & otherwise \end{cases}$$

$$output=\begin{cases} q & if\ \sum_{n=1}^{4} h(x_n,i)<1\ \vee\ x_0\neq b \\ p & if\ \sum_{n=1}^{4} h(x_n,i)\geq 1\ \wedge\ x_0=b \end{cases}$$

Step3: Connected Shrink Operator

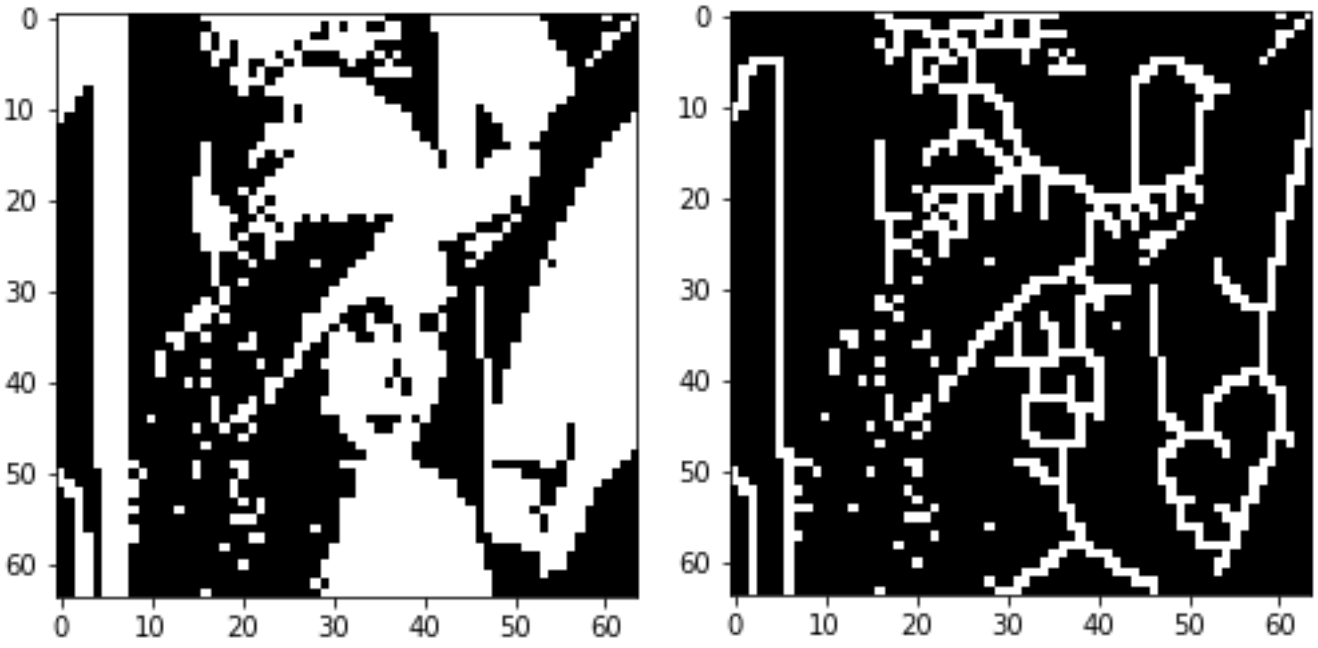
Formula:

for 4-connectivity

$$h(b,c,d,e)=\begin{cases} 1 & if\ b=c\wedge(b\neq d\ \vee\ b\neq e) \\ 0 & otherwise \end{cases}$$

$$output=f(a_1,a_2,a_3,a_4,x_0)=\begin{cases} g & if\ exactly\ one\ of\ a_1,a_2,a_3,a_4=1 \\ x_0 & otherwise \end{cases}$$

Step4: Compare the shrink result with marked image

Step5: repeat Step2~4 **7** times

Compare original downsample and the Result: