**HW7 Report**

R10922067 林云雲

**Introduction**

This program applies the thinning operator to an binary image. The overall process includes:

*Preprocess*. Binarize it with threshold=128, and then down-sample the source image using 8x8 block size with the topmost-left pixel’s value

*Main Process*. Compute the Thinning Operator ( 4 connected ) of the binary image.

**Usage**

Place the source image and main.py under the same directory. Run the following command in the terminal.

python3 main.py -s <source>

Parameters

-s <source> : the file path of source image, default = lena.bmp

**Thinning Operator**

The Thinning Operator is a combination of *Yokoi Operator*, *Pair Relationship Operator*, and *Connected Shrink Operator*. The operation is comprised of the following steps:

**1.** Apply the *Yokoi Operator* to the input binary image to generate an image of Yokoi connectivity numbers.

**2.** For each pixel starting from top-left to bottom-right:

**2-1.** Apply the *Pair Relationship Operator* to this Yokoi image with Yokoi connectivity number = 1 chosen to be the masked value . If the pixel satisfies the pair relationship condition, it receives an output .

**2-2.** Apply the *Connected Shrink Operator* to the input pixel, and get the output that indicates if the pixel is removable or not.

**2-3.** Remove the pixel if both conditions of 2.1. and 2.2. are satisfied.

**3.** Repeat **1.** and **2.** until no changes are made to the image.

**4.** The result is saved as thinning.bmp ( 64x64 pixels ) as shown below.

