Machine Vision

Homework#3

Deadline: 2024/05/01 23:59:59

Robot Vision Lab (Room 1421)

TAs: 魏士涵 t112598058@ntut.edu.tw

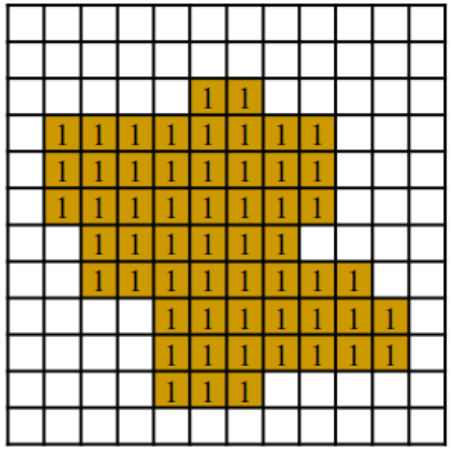
賴靖嫻 t112598008@ntut.edu.tw

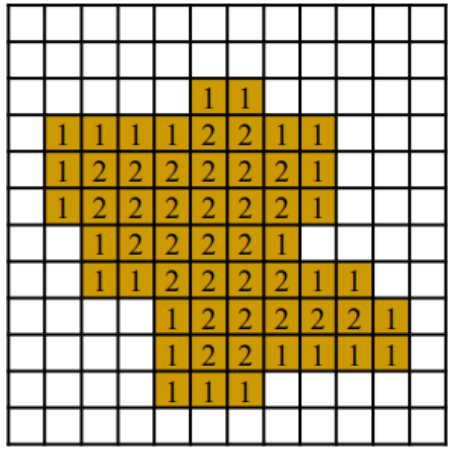
HW#3

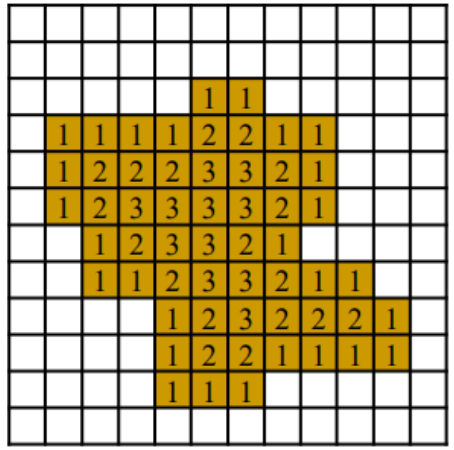
- Medial axis skeletonization
  - 1-1. Do the 8-distance transform.

    (u, v) should be in the 8-neighbor of $(i\ , j)$

$$f^0[i,j] = f[i,j]$$
$$f^m[i,j] = f^0[i,j] + \min(f^{m-1}[u,v])$$



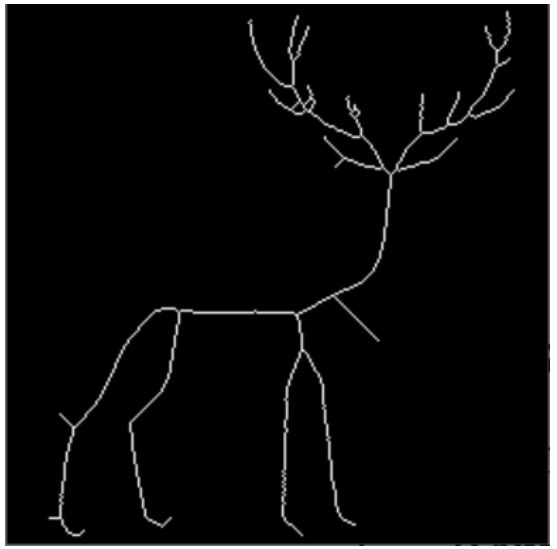




The figure left shows the 4-distance transform, you should do the 8-distance transform.

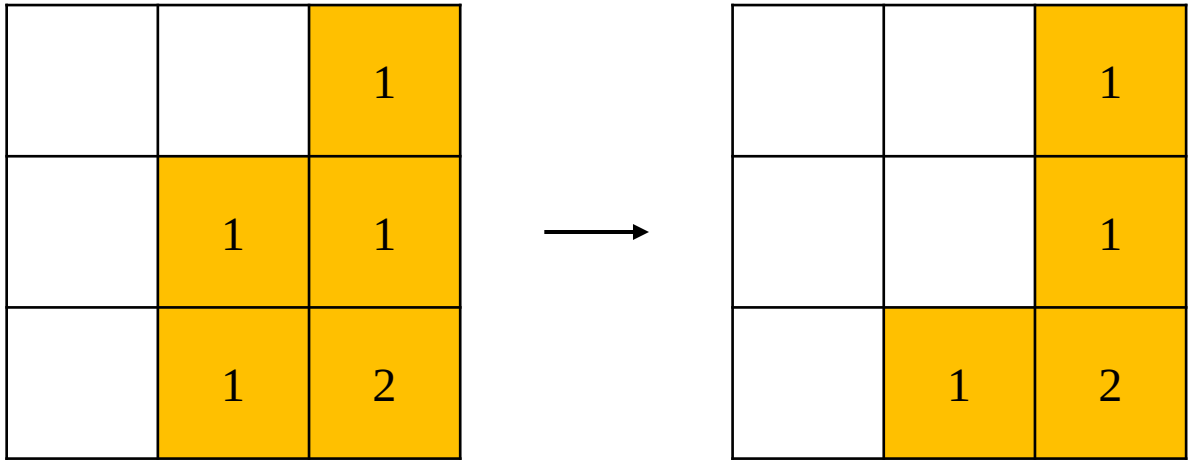
HW#3

- Medial axis skeletonization
  - ➢ 1-2. Find the medial axis.
    1. Remove pixels that are not local maximum (of distance) in their neighbors.
    2. You need to keep the connectivity (8-connectivity), of every 3x3 neighbors of each pixel.
    3. After removing pixels that are not local maximum without losing the connectivity, redundant pixels should be removed.

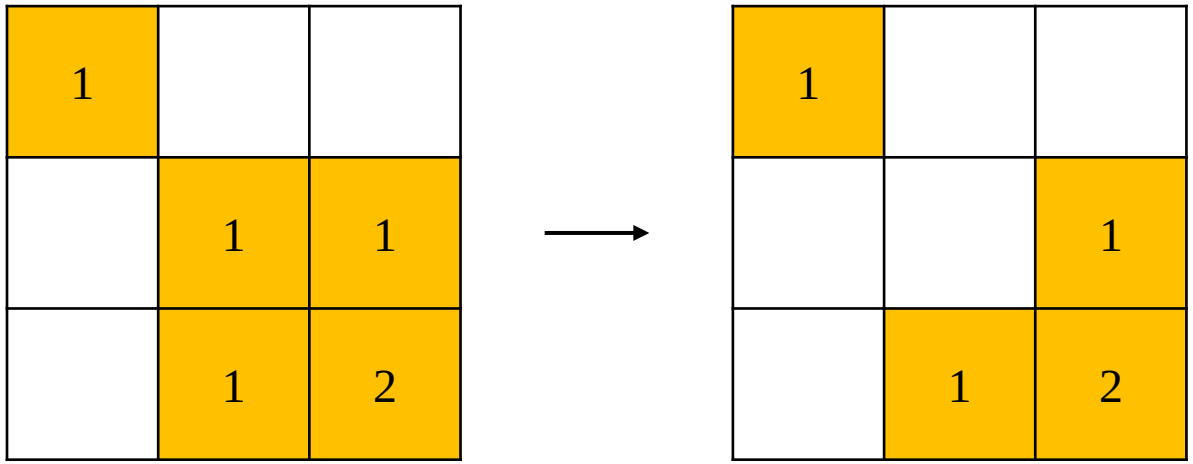


HW#3

- Examples for removing pixels



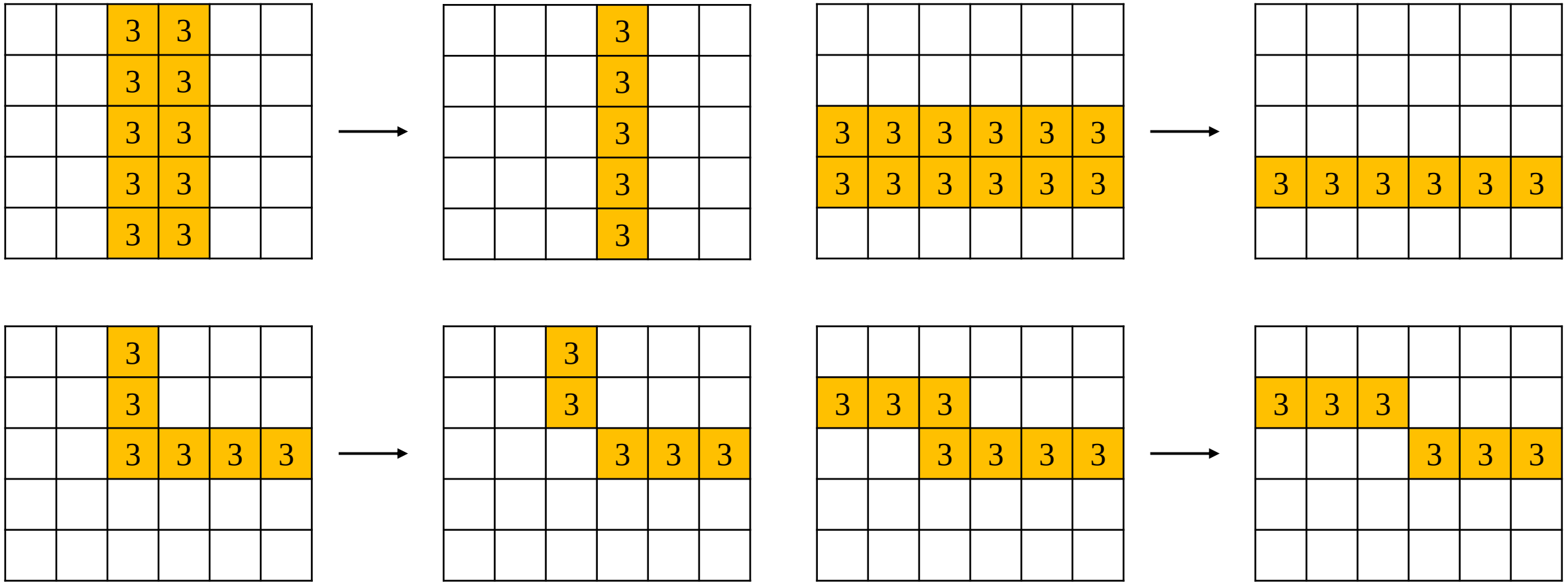
Can be removed



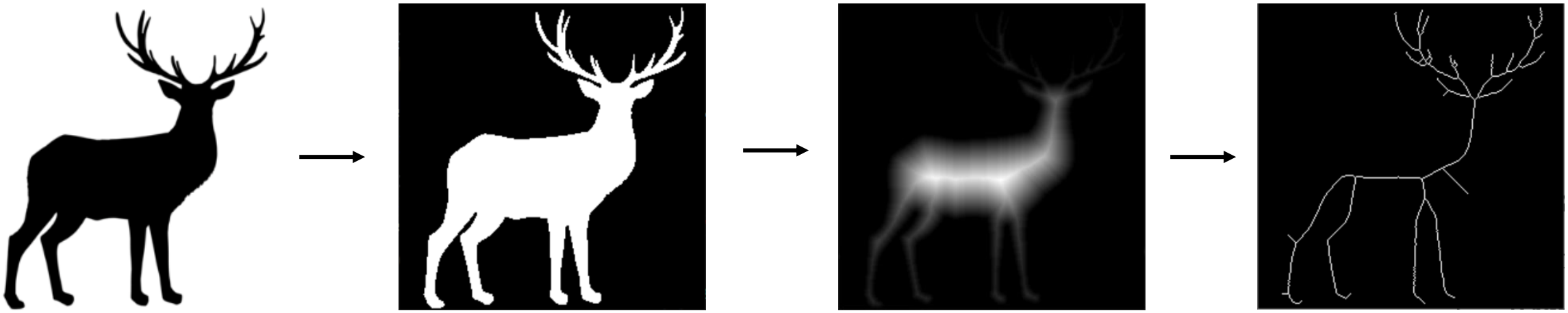
Can not be removed

HW#3

- Examples for removing redundant pixels



HW#3



Original image

Binary image

Distance transform

Medial axis

HW#3

※ Note that the binary image should be the following:

Original image

Binary image

HW#3

- Images

Machine

Vision

HW#3

- Report
  - Student ID
  - Name
  - Describe the main part of your method (or explain your code)
  - Result images
  - Explain the results you get

HW#3

- Rules in using C/C++ OpenCV Lib
  - ➢Use OpenCV-2.x version
  - ➢Allow use:
    1. Read, save, show image (cvLoadImage, cvShowImage, …)
    2. Define image (Mat)
    3. Get image size (cvSize, cvGetSize)
  - ➢Not Allow use :
    1. Cannot use the function of Lib to do the main part of homework.

       Example: cv::distanceTransform(image, distance, DIST_L2, 3)

       ※ Other libs also not allow use to do the main part of homework

HW#3

- Rules in using Python OpenCV Lib
  - ➢Allow use:
    1. Read, save, show image (cv2.imread, cv2.imshow, …)
    2. Define image
    3. Get image size
  - ➢Not Allow use:
    1. Cannot use the function of Lib to do the main part of homework.

       Example: cv2.distanceTransform(image, cv2.DIST_L2, 3)
    2. Other libs also not allow use to do the main part of homework

       Example: skimage.morphology.medial_axis(image, return_distance=True)

HW#3

- Grade
  - Program(80%)
    - Q1-1(40%)
    - Q1-2(40%)
  - Report(20%)
  - Additional(10%)

HW#3

- Folder Structure
  - ➢There are 8 images in the results folder.
  - ➢Write all questions in one program

Python

```
112598058_hw3/
├── images/
│   ├── img1.jpg
│   ├── img2.jpg
│   ├── img3.jpg
│   └── img4.jpg
├── results/
│   ├── img1_q1-1.jpg
│   ├── img1_q1-2.jpg
│   ├── img2_q1-1.jpg
│   ├── img2_q1-2.jpg
│   ├── img3_q1-1.jpg
│   ├── img3_q1-2.jpg
│   ├── img4_q1-1.jpg
│   └── img4_q1-2.jpg
├── 112598058_hw3.py
├── 112598058_hw3.pdf
└── Readme.txt (Optional)
```

C/C++

```
112598058_hw3/
├── project_hw3/
│   ├── images/
│   │   ├── img1.jpg
│   │   ├── img2.jpg
│   │   ├── img3.jpg
│   │   └── img4.jpg
│   ├── results/
│   │   ├── img1_q1-1.jpg
│   │   ├── img1_q1-2.jpg
│   │   ├── img2_q1-1.jpg
│   │   ├── img2_q1-2.jpg
│   │   ├── img3_q1-1.jpg
│   │   ├── img3_q1-2.jpg
│   │   ├── img4_q1-1.jpg
│   │   └── img4_q1-2.jpg
│   ├── include/
│   │   └── func.h
│   ├── func.cpp
│   └── main.cpp
├── 112598058_hw3.pdf
└── Readme.txt (Optional)
```

HW#3

- Please compress your files.
  - Example: 112598058_hw3.zip
- Deadline: 2024/05/01 23:59:59
  - For each hour late, 10% of the total score will be deducted.
- Don’t share your code and your report with other students.

  Do it by yourself.