

Machine Vision

Homework#3

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

Robot Vision Lab (Room 1421)

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HW#3

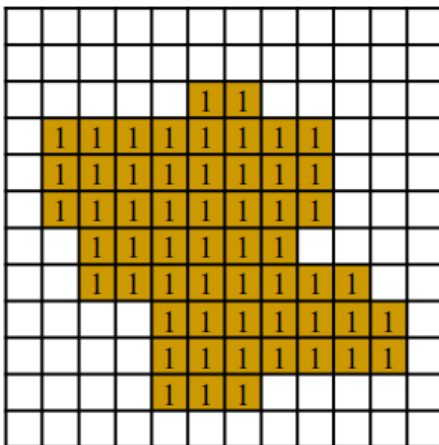
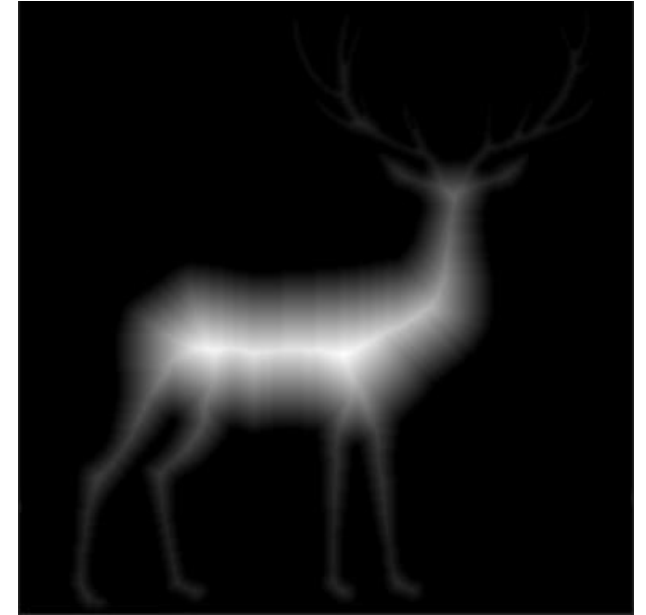
- Medial axis skeletonization

- 1-1. Do the 8-distance transform.

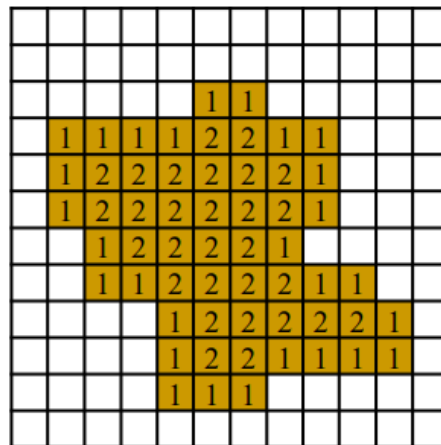
(u, v) should be in the 8-neighbor of (i, j)

$$f^0[i, j] = f[i, j]$$

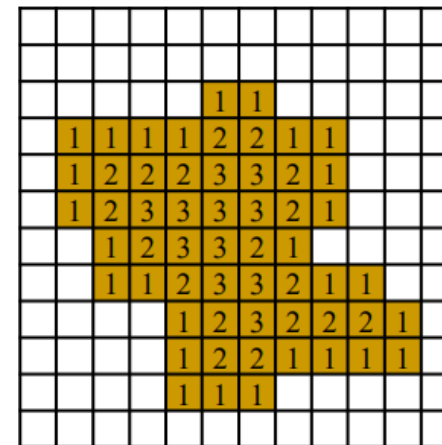
$$f^m[i, j] = f^0[i, j] + \min(f^{m-1}[u, v])$$



0th pass



1st pass



2nd pass

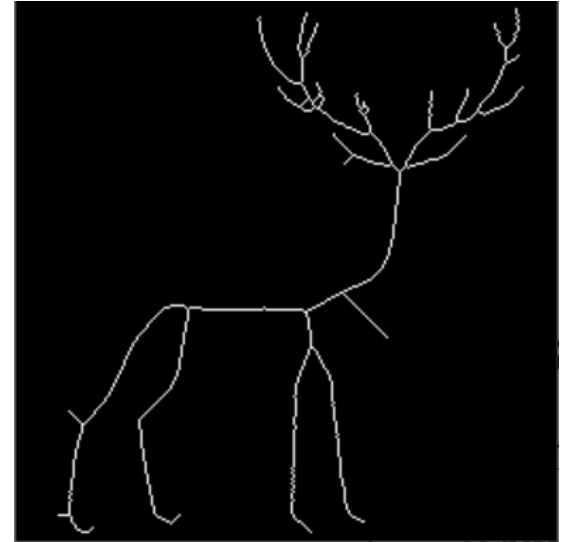
The figure left shows the 4-distance transform, you should do the 8-distance transform.

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

		1
	1	1
	1	2



		1
		1
	1	2

Can be removed

1		
	1	1
	1	2

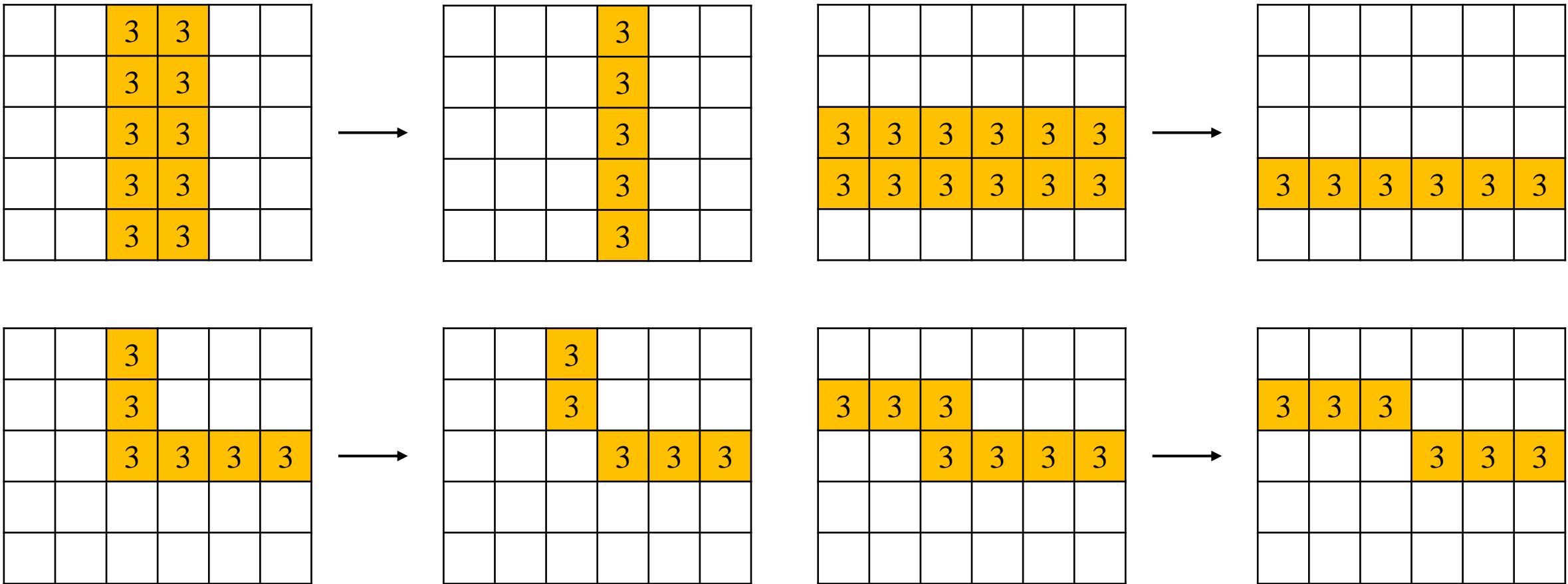


1		
		1
	1	2

Can not be removed

HW#3

- Examples for removing redundant pixels



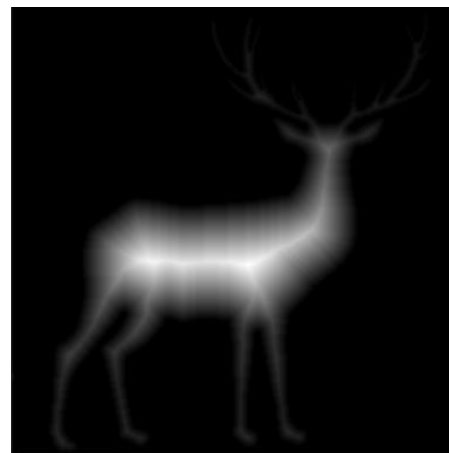
HW#3



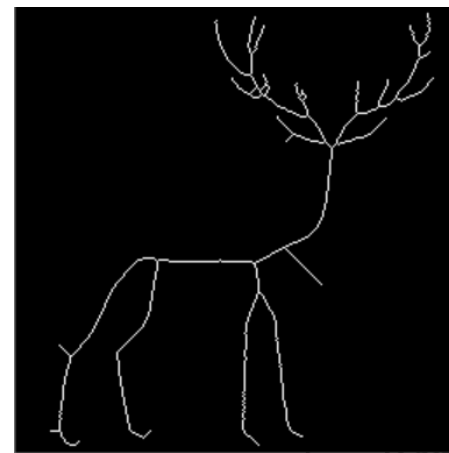
Original image



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

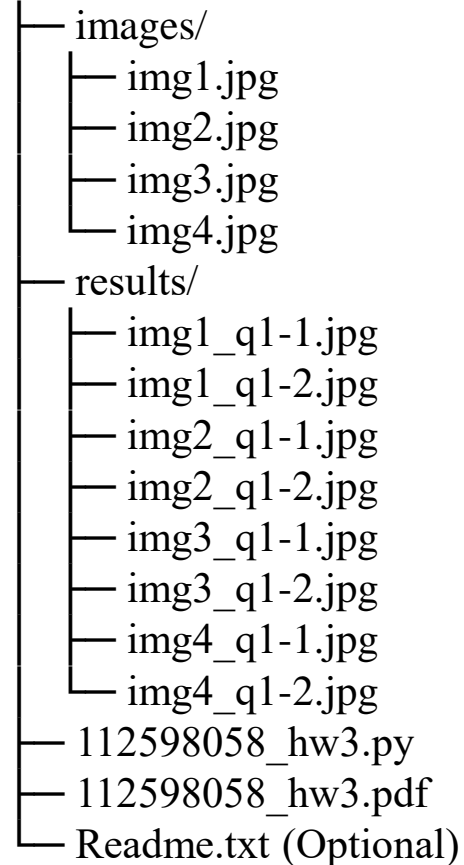
- Folder Structure

- There are 8 images in the results folder.

- Write all questions in one program

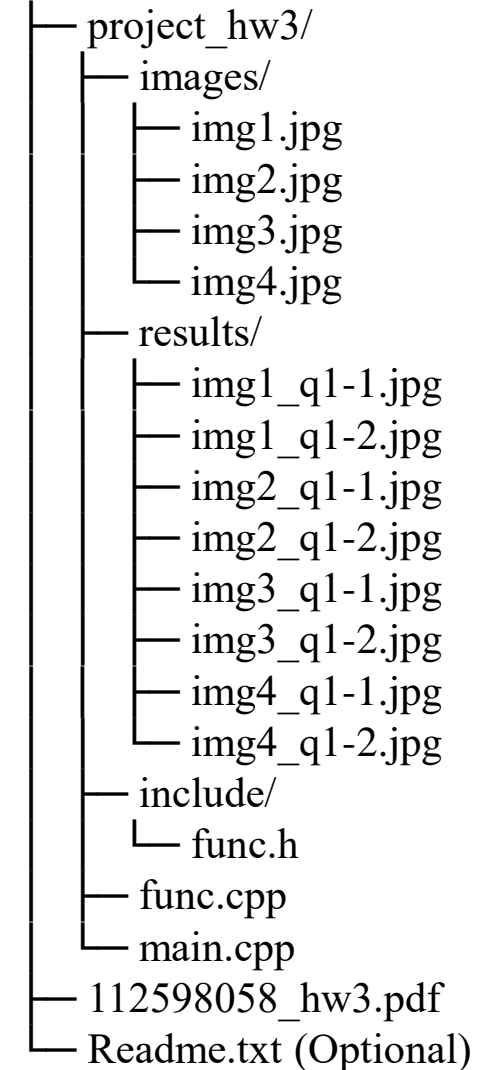
Python

112598058_hw3/



C/C++

112598058_hw3/



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.