

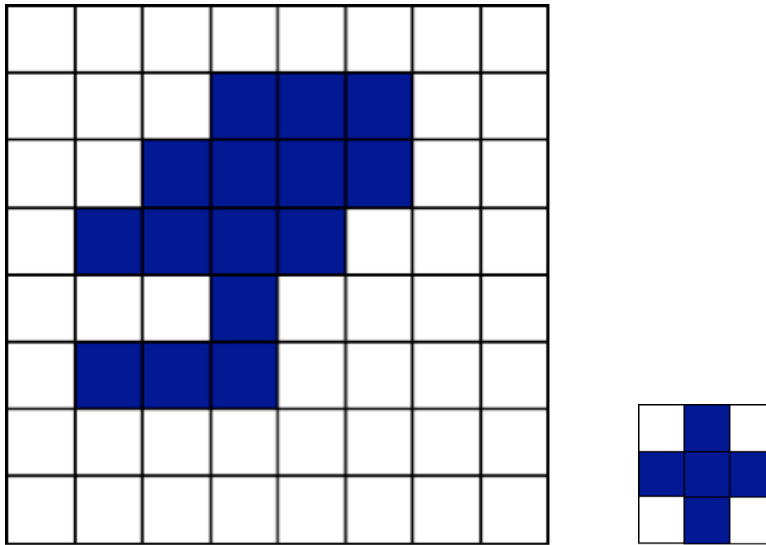
COC202 Computer Vision

Lab 3 – Morphological image processing

In this lab, we will implement some morphological image processing operations and verify them using Matlab's image processing toolbox.

If you have not yet finished the exercises from the previous lab, do them first.

1. Create binary image matrices (using Matlab's `logical` data type) for the sample image and the structuring element from the lecture, i.e. for the following:



2. Write a function that implements a morphological erosion operation. The function should be passed an image and a structuring element (of size 3x3) and return the eroded image.

Try your function on the above image.

Hint: In order to obtain an image that is the same size of the input image, you will need to pad the image (e.g. with 0s) first. The `padarray()` function should be useful for this.

Look for the equivalent function in Matlab's image processing toolbox to see whether you obtain the same result.

3. Write a function that implements a morphological dilation operation. The function should be passed an image and a structuring element (of size 3x3) and return the dilated image.

Try your function on the above image.

Look for the equivalent function in Matlab's image processing toolbox to see whether you obtain the same result.

4. Write a function that implements a morphological opening operation. The function should be passed an image and a structuring element (of size 3x3) and return the opened image.

Try your function on the above image.

Look for the equivalent function in Matlab's image processing toolbox to see whether you obtain the same result.

5. Write a function that implements a morphological closing operation. The function should be passed an image and a structuring element (of size 3x3) and return the opened image.

Try your function on the above image.

Look for the equivalent function in Matlab's image processing toolbox to see whether you obtain the same result.

6. Download the *fingerprint.tif* image from learn and apply morphological operations to remove image noise and enhance the ridges of the fingerprint.

Once you have finished all exercises you may leave the lab.

Additional exercises for further study:

7. Write a function that performs morphological boundary extraction.

Download the *head.tif* image from learn and apply your function to it.

8. Write a function that displays the results of the previous exercise, asks the user to click somewhere inside the boundary of the head (Matlab's `getpts()` function should be useful here) and then performs morphological region/hole filling.