DMET 1002 – Advanced Media Lab

Lab 5 Procedure

# Morphological Operators

In all parts of this lab, you will process the binary images "Cameraman_bin.jpg" and "Fingerprint.jpg" shown below. You will apply different morphological operators to each image as detailed below. You will be implementing each of the parts detailed below using MATLAB.

## PART 1: Dilation

Write a MATLAB function to apply the dilation operator detailed in the preparation document to the "Cameraman_bin.jpg" image. The function should take the image and the size of a square structuring element and it should output the resulting dilated image.

1. **Show the output image for a square structuring element of size 3 x 3**
2. **Show the output image for a square structuring element of size 7 x 7**
3. **From the output images, what is the impact of increasing the size of the structuring element on the output dilated image?**

## PART 2: Erosion

Write a MATLAB function to apply the erosion operator detailed in the preparation document to the "Cameraman_bin.jpg" image. The function should take the image and the size of a square structuring element and it should output the resulting eroded image.

4. **Show the output image for a square structuring element of size 3 x 3**
5. **Show the output image for a square structuring element of size 7 x 7**
6. **As explained in the preparation document, contours of the image can be obtained from the eroded image. Show the contours obtained from each of the images you obtained in (4) and (5)**

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## PART 3: Opening and Closing

Use the functions you implemented in Part 1 and Part 2 to implement the opening followed by the closing operators for noise filtering. Write a MATLAB function to apply opening followed by closing to the "Fingerprint.jpg" that takes as inputs the image and the size of the square structuring element. The function should return the filtered image.

**7. Show the filtered image obtained using a structuring element of size 3 x 3**
**8. Show the filtered image obtained using a structuring element of size 7 x 7**
**9. Comment on the effect of increasing the size of the structuring element on the output of (7) and (8)**