ECE/OPTI 532, Spring 2023

Homework 6 Assignment

Due Tue. April 18

Part 1: Morphological Filtering

Write a computer program to perform binary dilation. Write a separate program to perform binary erosion. Limit the output image to be the same size as the input image. Assume the foreground pixels have value 0, or provide an option to specify whether pixel value 0 corresponds to foreground or background. Assume the structuring element is a solid square, where the width is an odd integer and the origin is at the center of the structuring element.

- Submit your commented source code.
- Run your programs on the sample image, `morph.png`, using a structuring element that is an 11-by-11 solid square. Assume the image is extended by background pixels. Submit the following output images:

  $I_1 = A \oplus B$
  $I_2 = A \ominus B$
  $I_3 = (A \ominus B) \oplus B$
  $I_4 = (A \oplus B) \ominus B$

Part 2: Texture Analysis

In the following image, were each pixel is represented as a 2-bit grayscale value.
The pixel values are undefined outside the region shown (no padding; not zero).
(a) Calculate the gray-level co-occurrence matrix, sym. $C_{45°,1.414}$
(b) Calculate the gray-level co-occurrence matrix, asym. $C_{90°,1}$

2	2	1	2	3
0	0	2	0	3
1	1	2	1	0
3	1	3	3	2
2	3	3	1	0