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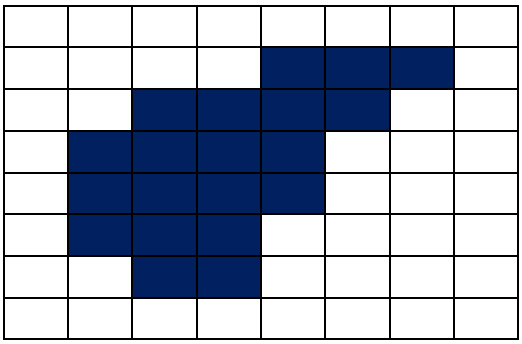
IMAGE PROCESSING

Labwork 3: Segmentation and Morphology

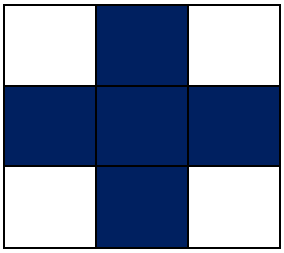
Part A. Pen-and-paper exercises:

Given the following image I and the structuring element S. Assume zero-padding outside the image boundary.

Image I:



Structuring element S:



- Compute the erosion of image I by the structuring element S
- Compute the dilation of image I by the structuring element S
- Compute the opening of image I by the structuring element S
- Compute the closing of image I by structuring element S

Part B. Python/OpenCV Practice:

- Download one grayscale image from the Internet, or use your own grayscale image.

Task B1: Load the downloaded grayscale image, then:

- Apply the three edge detection methods: Laplacian, Sobel, Canny.
- Display original image and highlighted images to see the difference.

Task B2: Add Gaussian noise to the downloaded grayscale image, then:

- Apply the three edge detection methods: Laplacian, Sobel, Canny.
- Smooth the noisy image using Gaussian blur.
- Apply Sobel, Laplacian and Canny again to the smoothing noisy image.
- Compare the edge detection results before and after smoothing.

Task B3: Perform image segmentation on the downloaded grayscale image using thresholding by doing the following tasks:

- Display the downloaded grayscale image and its histogram.
- Select two manual threshold values.
- Apply global thresholding for each selected threshold.
- Apply Otsu thresholding.
- Compare the results.

Task B4: Perform the morphological operations in Part A again but by coding.