Zürcher Hochschule
für Angewandte Wissenschaften

School of
Engineering
ISC Institute of Signal Processing
and Wireless Communications

January 12, 2022
Digital Image Processing
Martin Loeser

Exercise Sheet 5

1 Dilation and Erosion

In Figure 1 gray pixels denote the foreground object whereas white pixels denote the background. Accordingly, gray pixels in the structure element *SE* represent logical *1*.

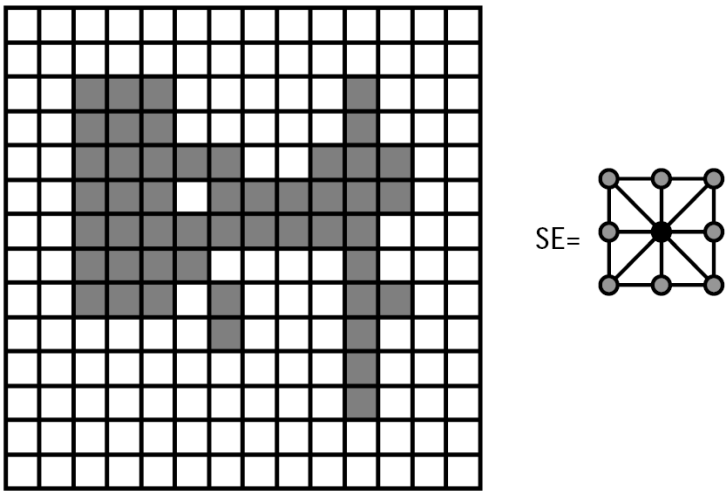

Figure 1: Object and structure element.

1. Apply the *dilation* operation to the image shown in Figure 1.
2. Apply the *erosion* operation to the image shown in Figure 1.
3. If you were to apply these two operations consecutively—would it make a difference in which order the are applied?

2 Set Operation

Figure 2 shows an image with two sets A and B.

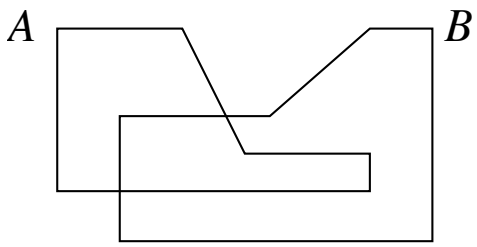

Figure 2: Two sets A and B.

Sketch the set

$$S = (A \cup B)^c \cup (A \cap B)$$

Solutions

Exercise 1

1. Dilation:

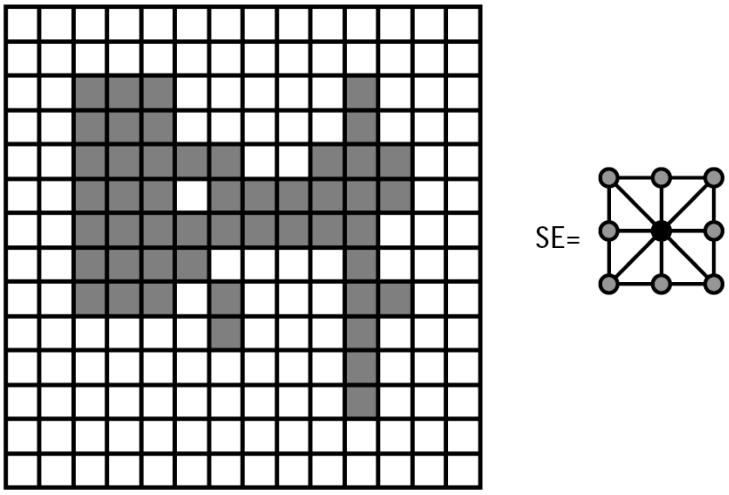

Figure 3: Image after dilation.

2. Erosion—that's a do-it-yourself exercise.

3. It does make a significant difference. Depending on the order it is either *opening* or *closing*.

Exercise 2

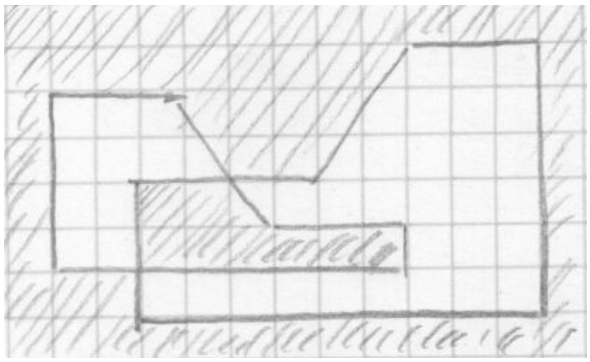

Figure 4: The resulting set S.