
Exercise 02.c In this exercise we are going to compare the number of operations in two alternatives for computing a morphological dilation with structuring element.

Let B be the $M \times M$ square structuring element.
Let C be the $1 \times M$ 1-D horizontal structuring element:

$x \dots xXx \dots x$ (Note: the number of pixels is M.)

Let D be the $M \times 1$ 1-D vertical structuring element.

x
 \cdot
 \cdot
 \cdot
 \cdot
 x
 X
 x
 \cdot
 \cdot
 \cdot
 x

(Note: the number of pixels is M.)

'X' denotes the origin of coordinates or center of the structuring element. B, C and D are centered structuring elements.

It can be observed that the following property holds:
 $B = \text{dilate}_C(D) = \text{dilate}_D(C).$

Estimate the number or 'max' operations that must be computed in order to process a $N \times N$ square input image using the following alternatives:
 $\text{dilate}_B(I)$
 $\text{dilate}_C(\text{dilate}_D(I))$

Border effects should not be considered for simplicity, i.e., all image pixels should be treated in the same manner.
