Dilation

- This operations consists of convolving an image A with some kernel (B), which can have any shape or size, usually a square or circle.
- The kernel B has a defined *anchor point*, usually being the center of the kernel.
- As the kernel B is scanned over the image, we compute the maximal pixel value overlapped by B and replace the image pixel in the anchor point position with that maximal value. As you can deduce, this maximizing operation causes bright regions within an image to "grow" (therefore the name *dilation*).
- The dilatation operation is: $\mathbf{dst}(x,y) = \max_{(x',y'):\,\mathtt{element}(x',y') \ne 0} \mathbf{src}(x+x',y+y')$
- Take the above image as an example. Applying dilation we can get:

- The bright area of the letter dilates around the black regions of the background.

Erosion

- This operation is the sister of dilation. It computes a local minimum over the area of given kernel.
- As the kernel B is scanned over the image, we compute the minimal pixel value overlapped by B and replace the image pixel under the anchor point with that minimal value.
- The erosion operation is: $\mathbf{dst}(x,y) = \min_{(x',y'):\,\mathtt{element}(x',y') \ne 0} \mathbf{src}(x+x',y+y')$
- Analagously to the example for dilation, we can apply the erosion operator to the original image (shown above). You can see in the result below that the bright areas of the image get thinner, whereas the dark zones gets bigger.