working with images

Mathematical Morphology

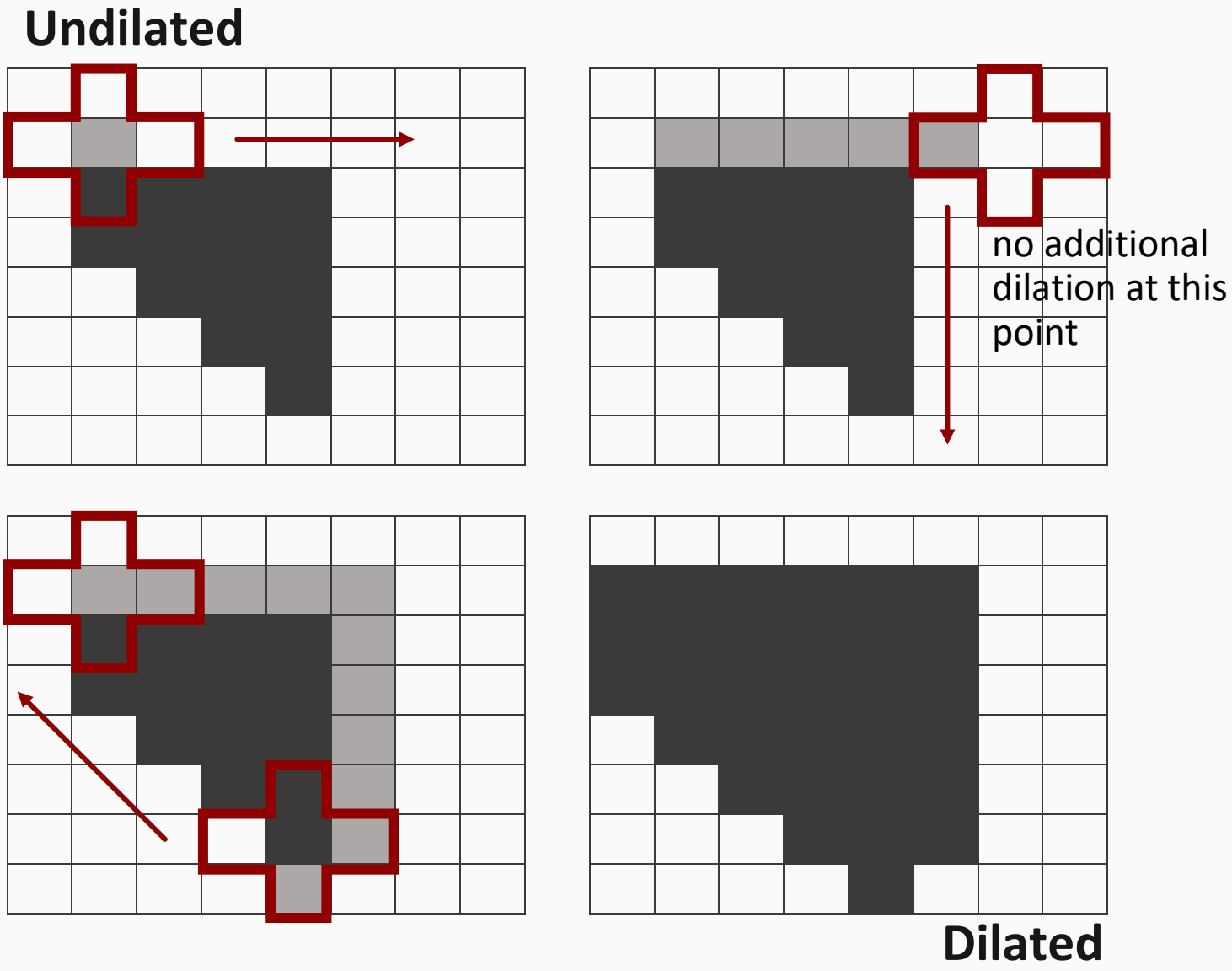
Dilation is a technique that **adds** a boundary of pixels around a bright object within an image.

Erosion is a technique that **removes** a boundary around a bright object within an image.

The above technique require an applied **structuring element**; a shape applied to the object:

The chosen **structuring element** traces the image to perform **dilation**:

The **center pixel** of the structuring element will be colored by the darkest (**minimum**) of the neighbors within the structuring element. The process is repeated as the **structuring element traces the image**. Note in the **second quadrant** in the illustration below that no neighbors will be colored dark; the only dark-colored pixel within the neighbors' proximity is one that was colored by the operation and *not* from the original image. The process continues around the entire image:

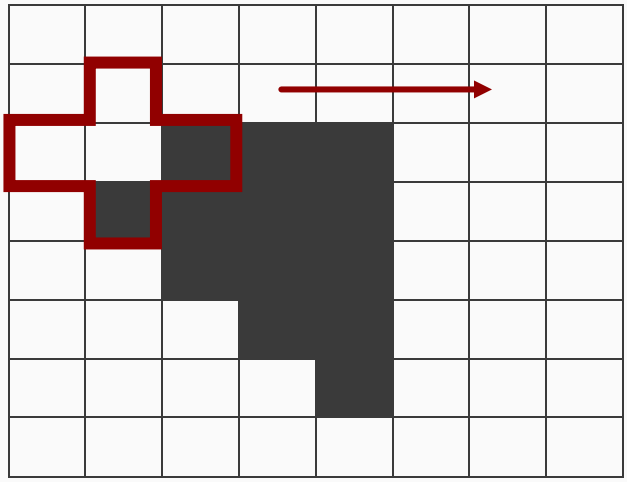


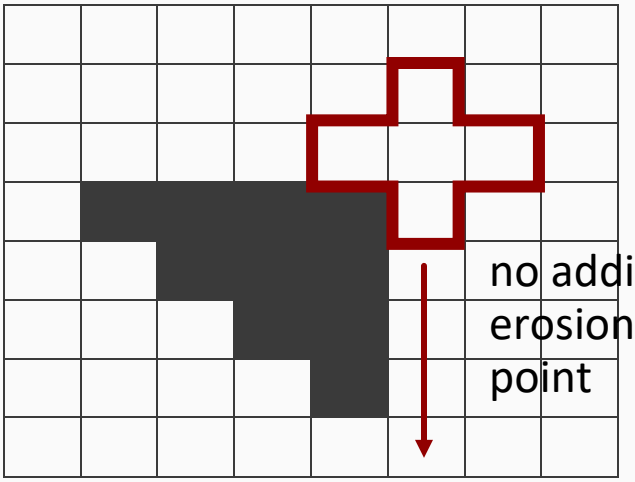
The edges of an image are the focal point within the operation above; the result is a **dilated** image.

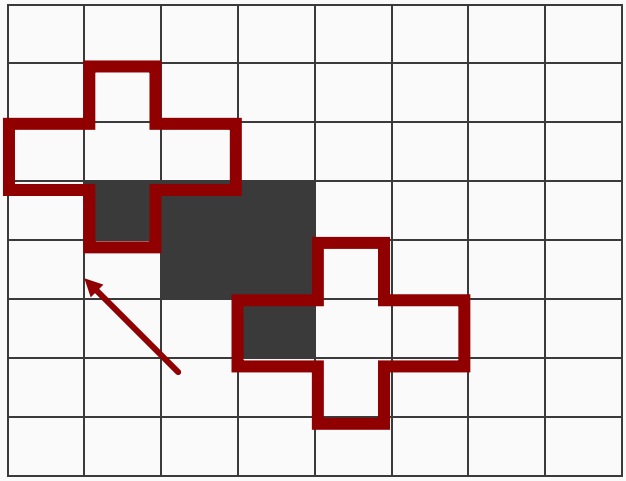
Erosion is simply the opposite operation of **dilation**. It is important to note however, that performing **Erosion** on an object subsequent to **dilation** will not necessarily reconstruct the object as before. The same property applies when **dilating** an object that was previously **Eroded**.

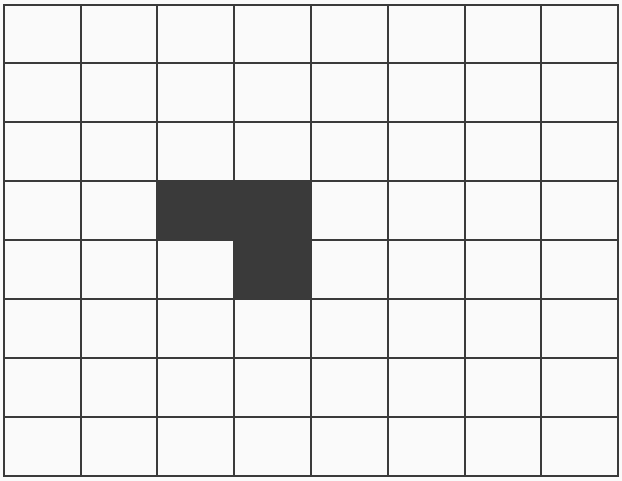
Erosion performs the operation of coloring the center pixel the **lightest** (**maximum**) of the neighbors within the **structuring element**. The object proceeds to be traced as before until convergence:

Uneroded





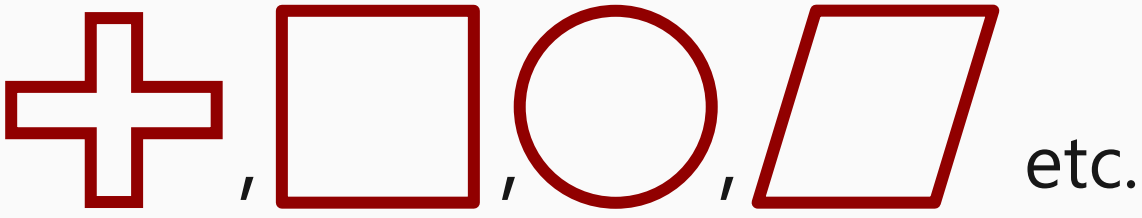


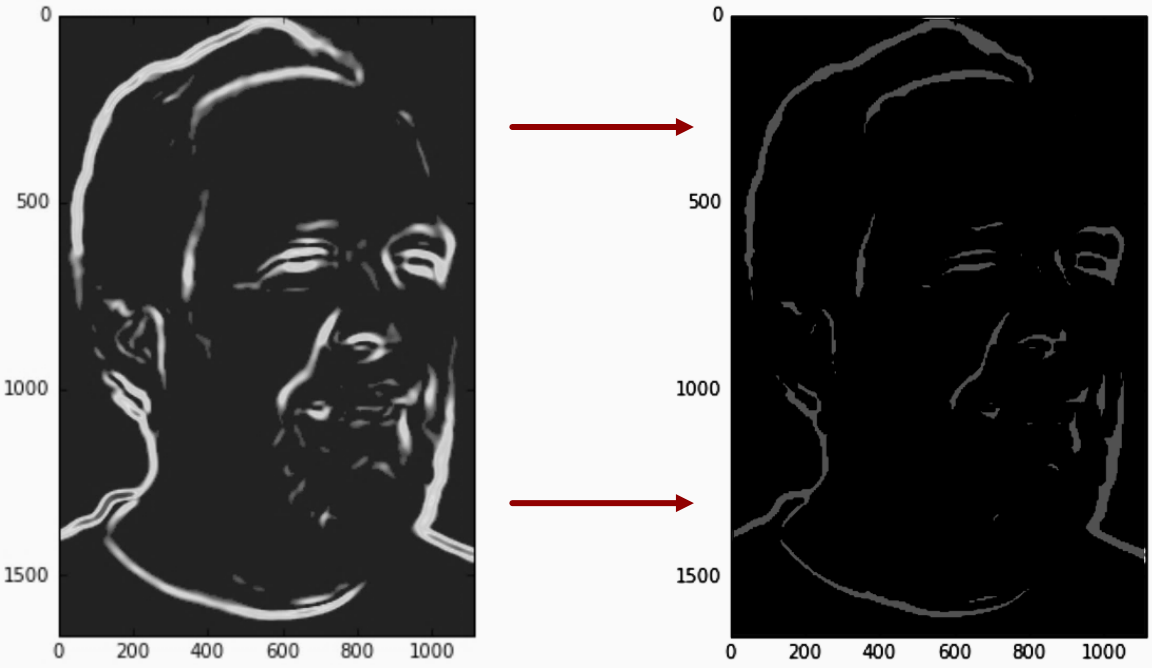


Eroded

The edges of an image are the focal point within the operation above; the result is an **eroded** image.

Depending on the object and the desired application of **Dilation** and **Erosion**, multiple structuring elements are available for the above operations:





The left image is an example of an image that has undergone **Sobel Edge Detection**. The resulting image has been **Eroded** using the techniques above. Note the brightness contrast is *not* relevant to the operation; the refinement of excess edges are a direct product of **Erosion**.

https://robhentac.wordpress.com/2010/09/21/morphological-operations/
http://homepages.inf.ed.ac.uk/rbf/HIPR2/open.htm