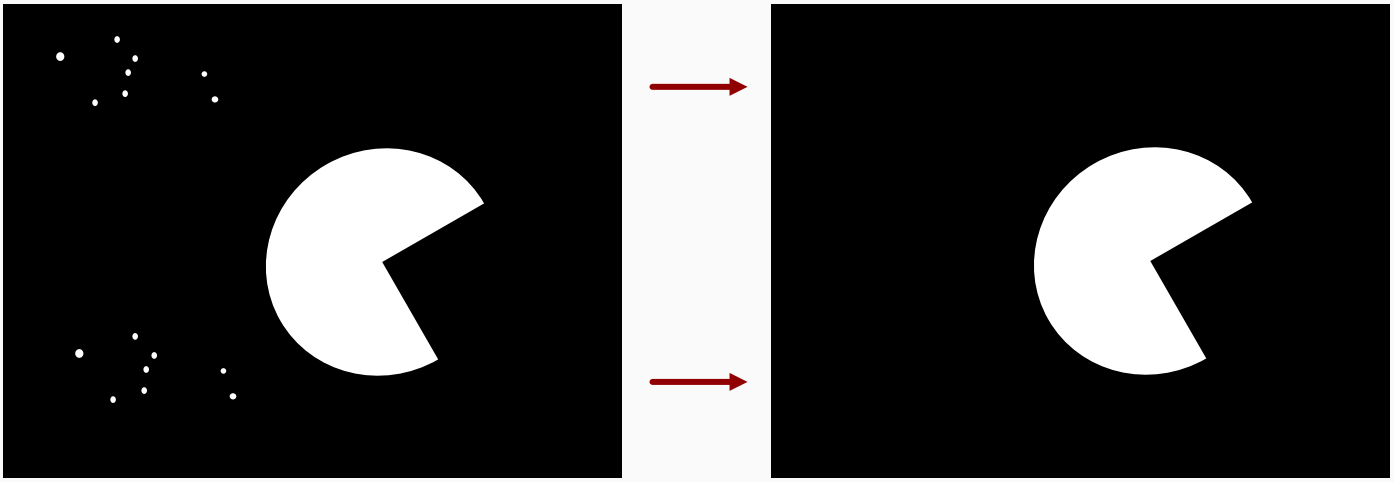
working with images

Opening and Closing

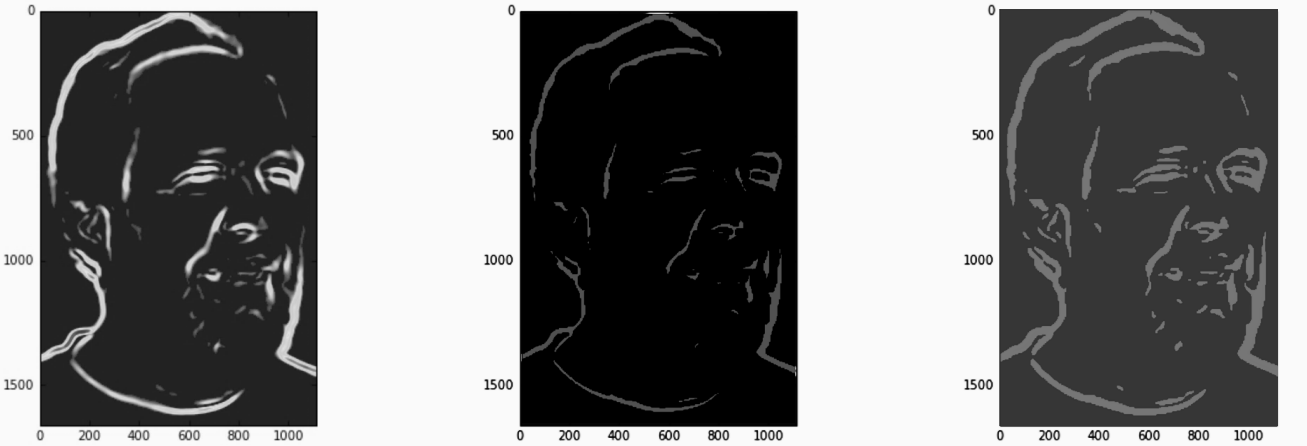
The operation of **Opening** is simply **erosion** followed by **dilation**.

Opening and **Closing** are useful techniques to eliminate certain types of noise or certain types of shapes depending on the **structuring element** chosen in application.

In theory, **erosion** will effectively remove the white noise seen in the image below. The outer layer of Pacman' will equally be removed. However, when the operation is followed by **dilation**, the outer layer of Pacman' will be restored without any of the previously removed white noise:



The following illustrates the **opening** operation with the working subject image:

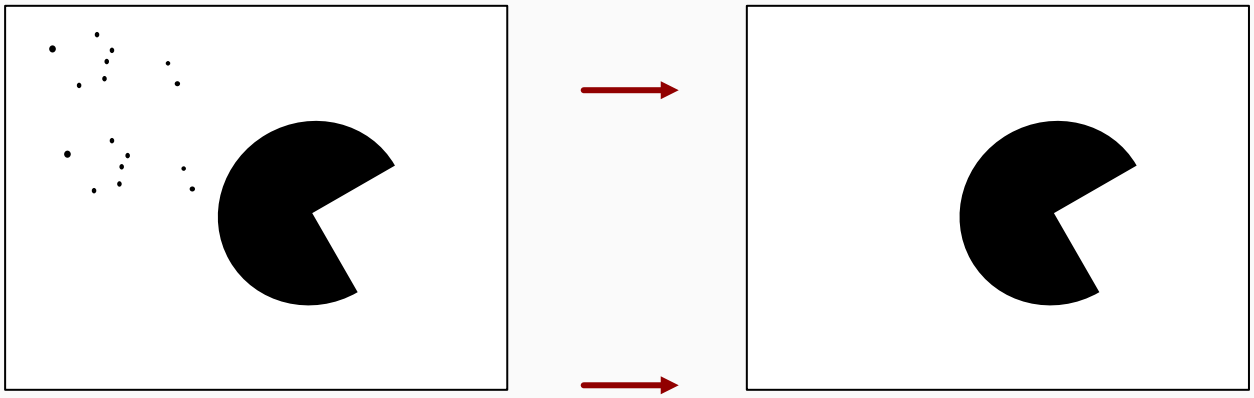


Sorbel Edge Detector **Erosion** **Dilation**

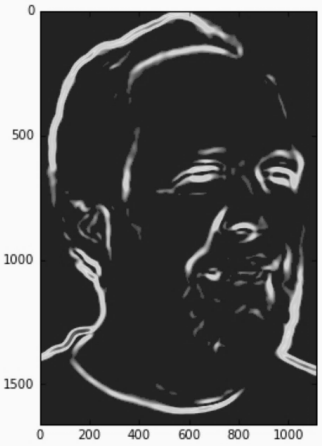
Opening

The operation of **Closing** is simply the opposite of **opening**; **dilation** followed by **erosion**.

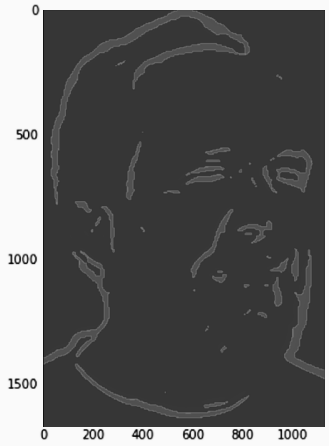
In theory, **dilation** will effectively and the white space in place of the pepper noise seen in the image below. The outer layer of Pacman' will equally be expanded, opposite when **opening** will remove the edge. When the operation of **dilation** is followed by **erosion**, the outer layer of Pacman' will be restored without any of the previously additional pepper noise:



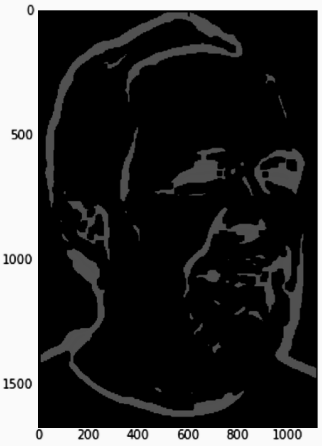
The following illustrates the **opening** operation with the working subject image:



Sorbel Edge Detector



Dilation



Erosion

Closing