



SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with ‘A’ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

**COURSE NAME : 19EC513 – IMAGE PROCESSING AND COMPUTER
VISION**

III YEAR / V SEMESTER

Unit IV- MORPHOLOGICAL IMAGE PROCESSING

Topic : Closing for binary and gray image



Opening Function

The gray-level opening function consists of a gray-level erosion followed by a gray-level dilation. It removes bright spots isolated in dark regions and smooths boundaries. The effects of the function are moderated by the configuration of the structuring element.

$$\text{opening}(I) = \text{dilation}(\text{erosion}(I))$$

This operation does not significantly alter the area and shape of particles because erosion and dilation are morphological opposites. Bright borders reduced by the erosion are restored by the dilation. However, small bright particles that vanish during the erosion do not reappear after the dilation.



Closing Function

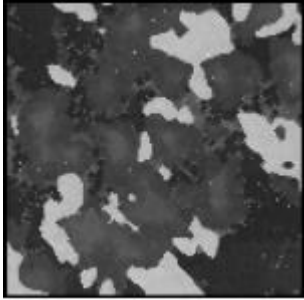
The gray-level closing function consists of a gray-level dilation followed by a gray-level erosion. It removes dark spots isolated in bright regions and smooths boundaries. The effects of the function are moderated by the configuration of the structuring element.

$$\text{closing}(I) = \text{erosion}(\text{dilation}(I))$$

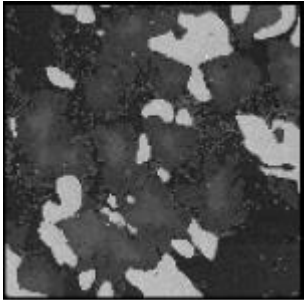
This operation does not significantly alter the area and shape of particles because dilation and erosion are morphological opposites. Bright borders expanded by the dilation are reduced by the erosion. However, small dark particles that vanish during the dilation do not reappear after the erosion.

Opening and Closing Examples

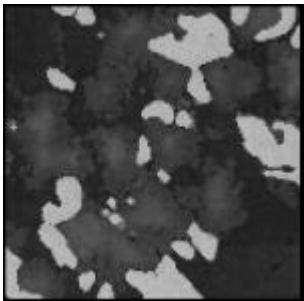
This example uses the following source image.



The opening function produces the following image.



A closing function produces the following image.



Note Consecutive applications of an opening or closing function always give the same results.



THANK YOU !!!