SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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Grade Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECE351 – IMAGE PROCESSING AND COMPUTER VISION

III B.E. ECE / V SEMESTER

UNIT 4 – MORPHOLOGICAL IMAGE PROCESSING

TOPIC – Dilation and Erosion

Morphology

1. Morphology generally concerned with shape and properties of objects.

2. Used for segmentation and feature extraction.

3. Two basic operations
   1. erosion
   2. dilation

Dilation and Erosion

Dilation : Adds pixels to the boundaries of objects in an image.

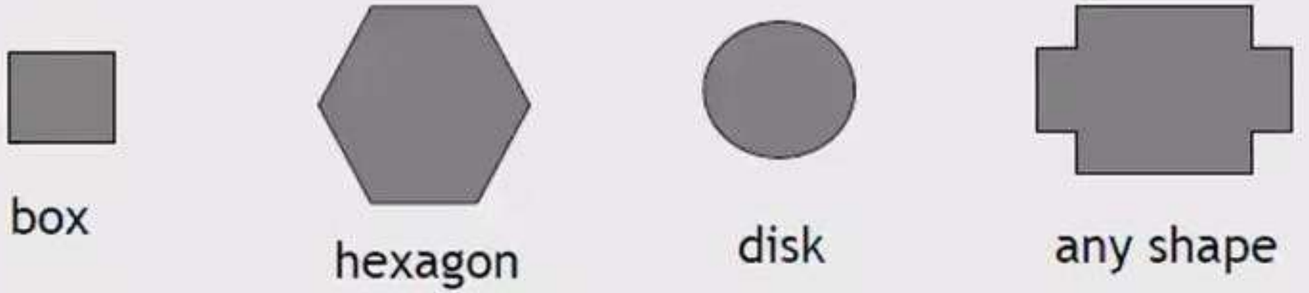
Erosion: Removes pixels on object boundaries.

Structuring element **:**The number of pixels added or removed from the objects in an image depends on the size and shape of the ***structuring element*** used to process the image.

Structuring Element

A structuring element is a shape mask used in the basic morphological operations.

They can be any shape and size that is digitally representable, and each has an origin.



box(length,width)

disk(diameter)

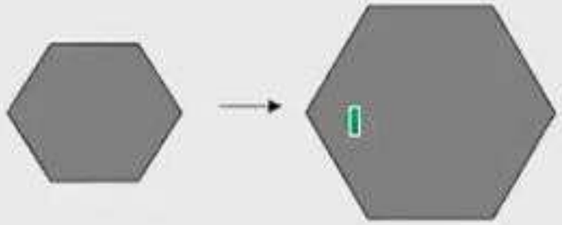
Dilation

- Fills in holes.
- Smoothes object boundaries.
- Adds an extra outer ring of pixels onto object boundary, ie, object becomes slightly larger.

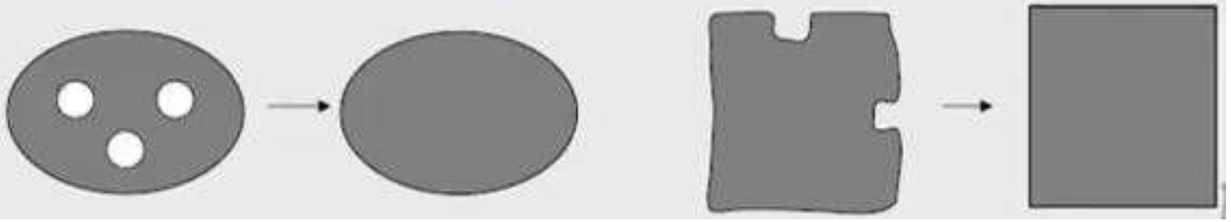
Dilation expands the connected sets of 1s of a binary image.

It can be used for

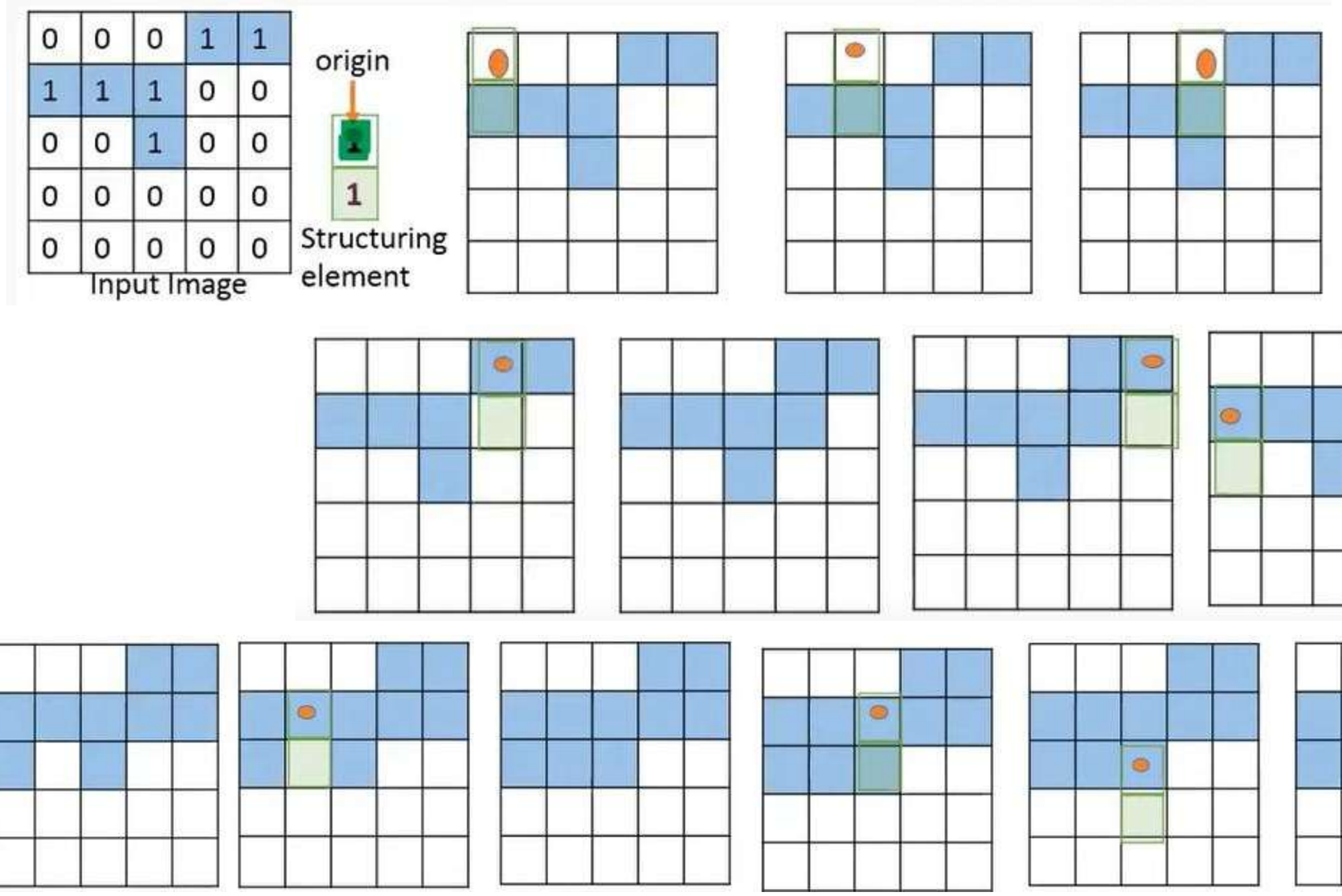
1. expanding shapes:



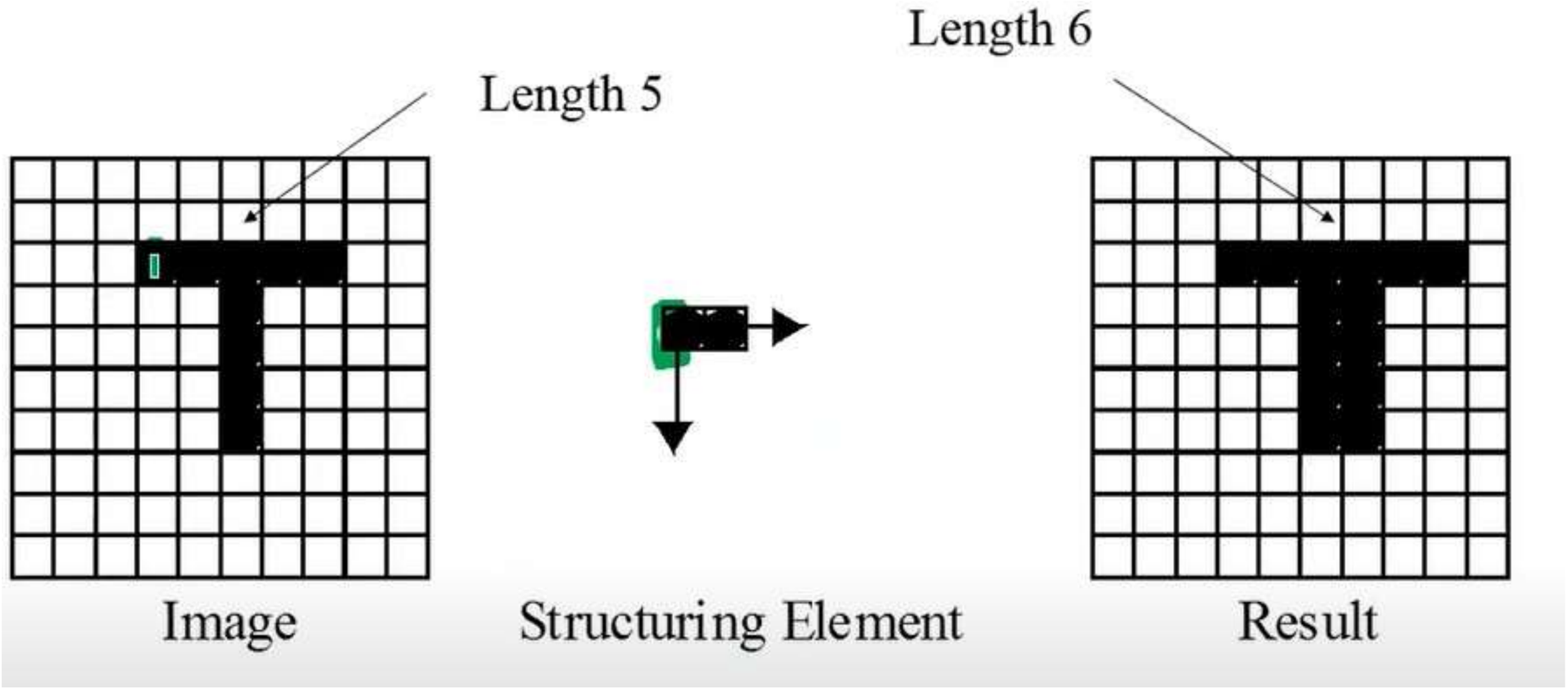
2. filling holes, gaps and gulfs:



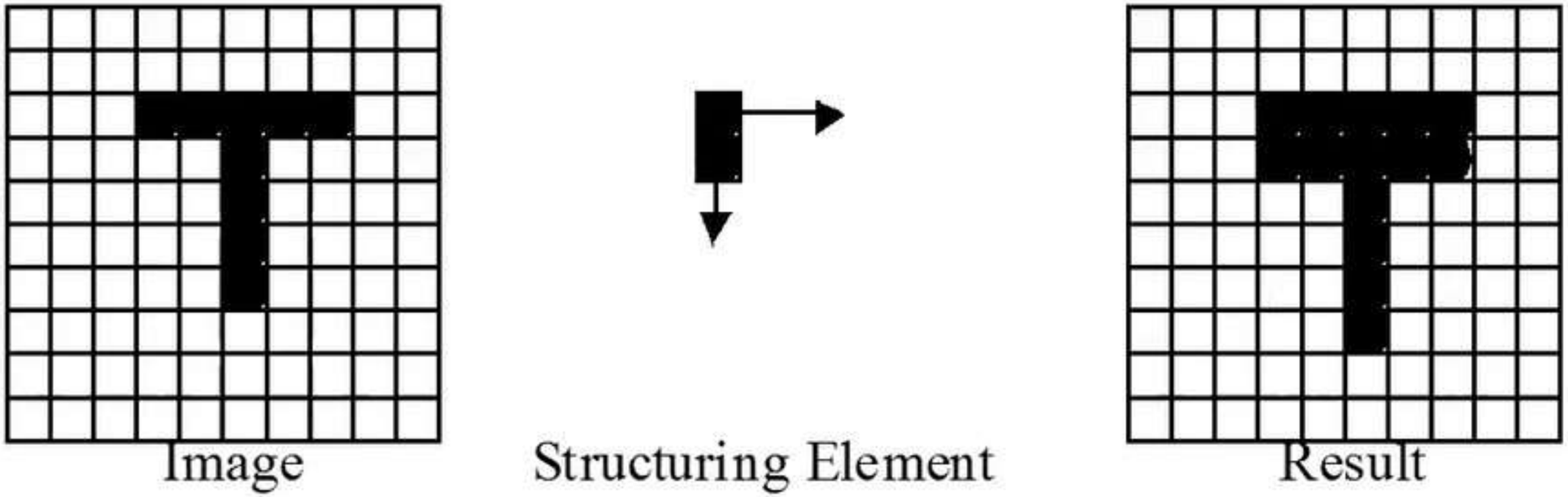
Example


0 0 0 1 1
1 1 1 0 0
0 0 1 0 0
0 0 0 0 0
0 0 0 0 0
Input Image
origin
1
Structuring element

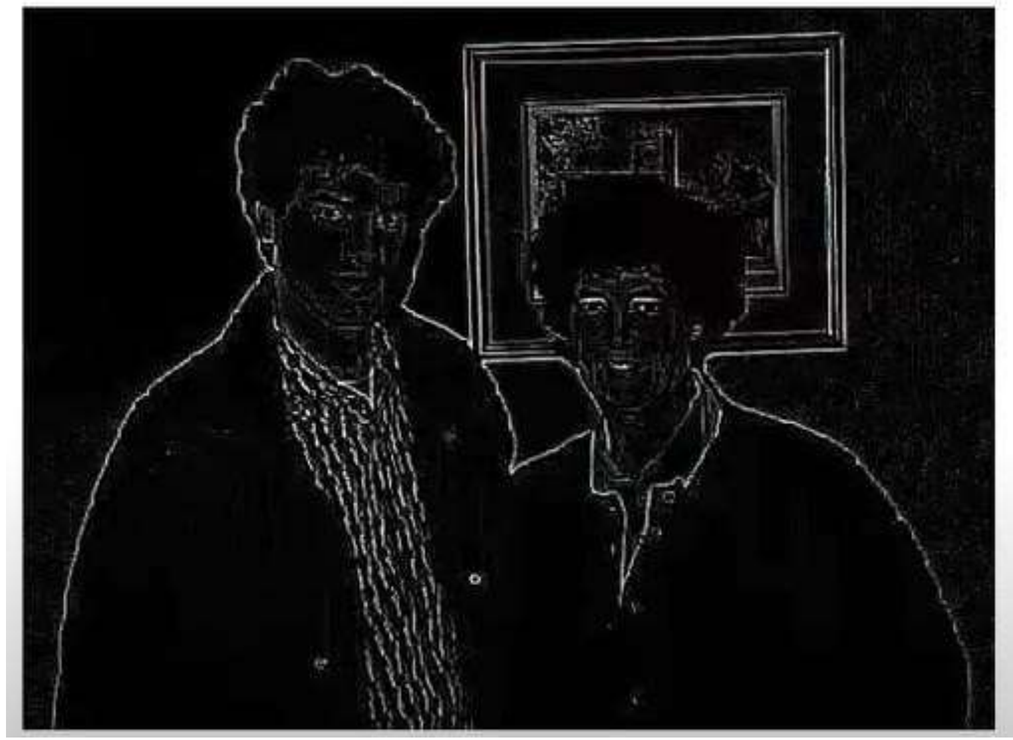
Structuring Element for Dilation



Structuring Element for Dilation



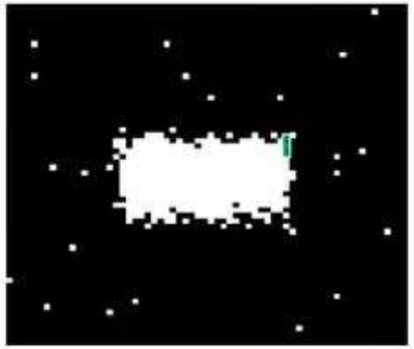
Dilation Example

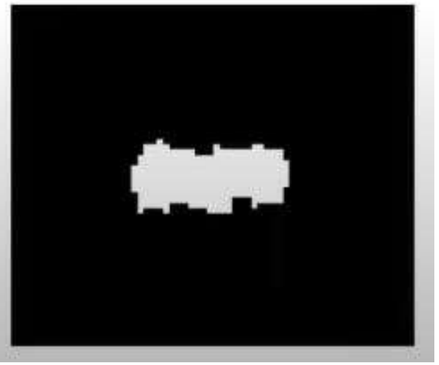


Erosion

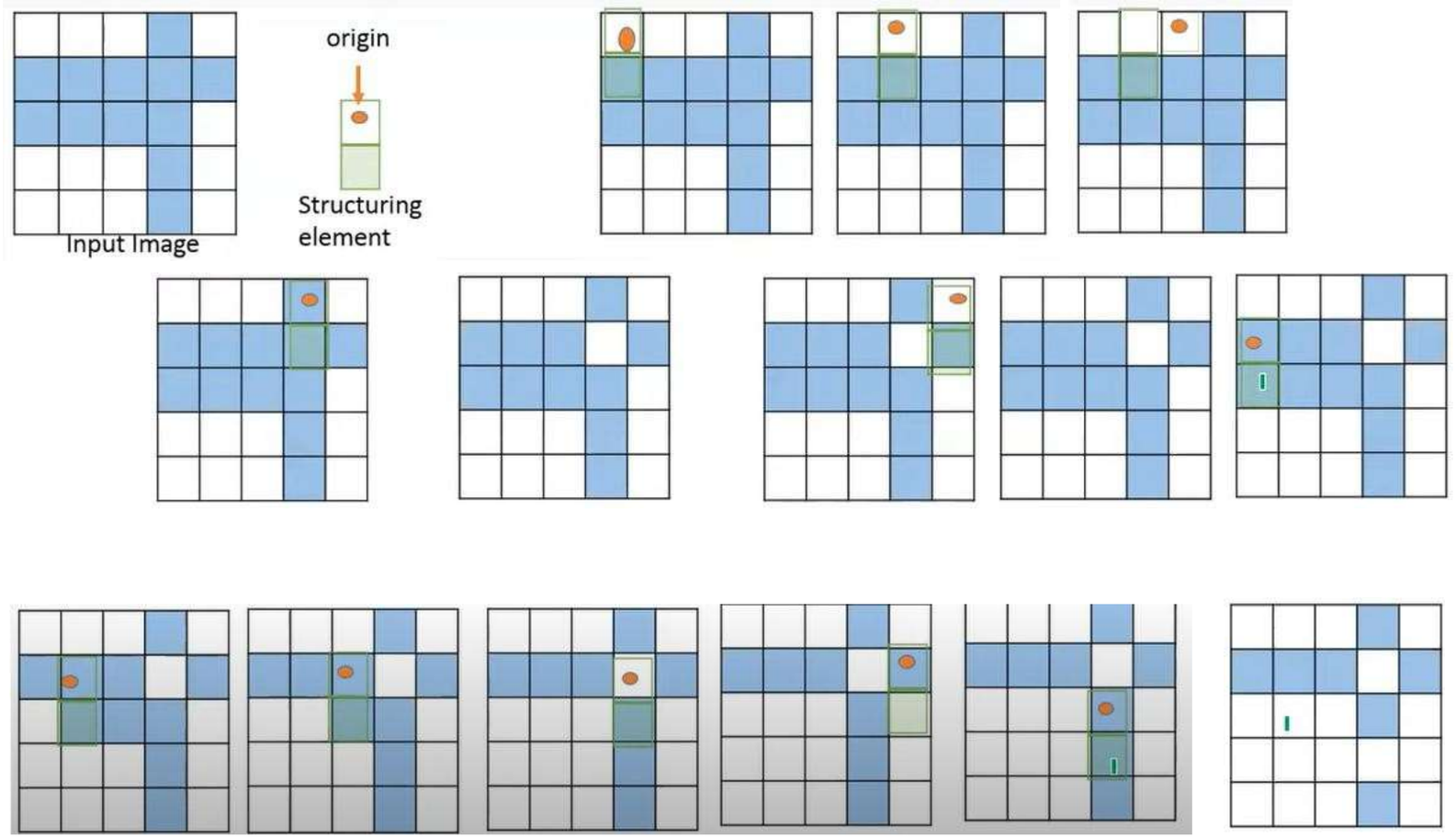
Typical Uses of Erosion

1. Removes isolated noisy pixels.
2. Smoothes object boundary.
3. Removes the outer layer of object pixels, ie, object becomes slightly smaller.

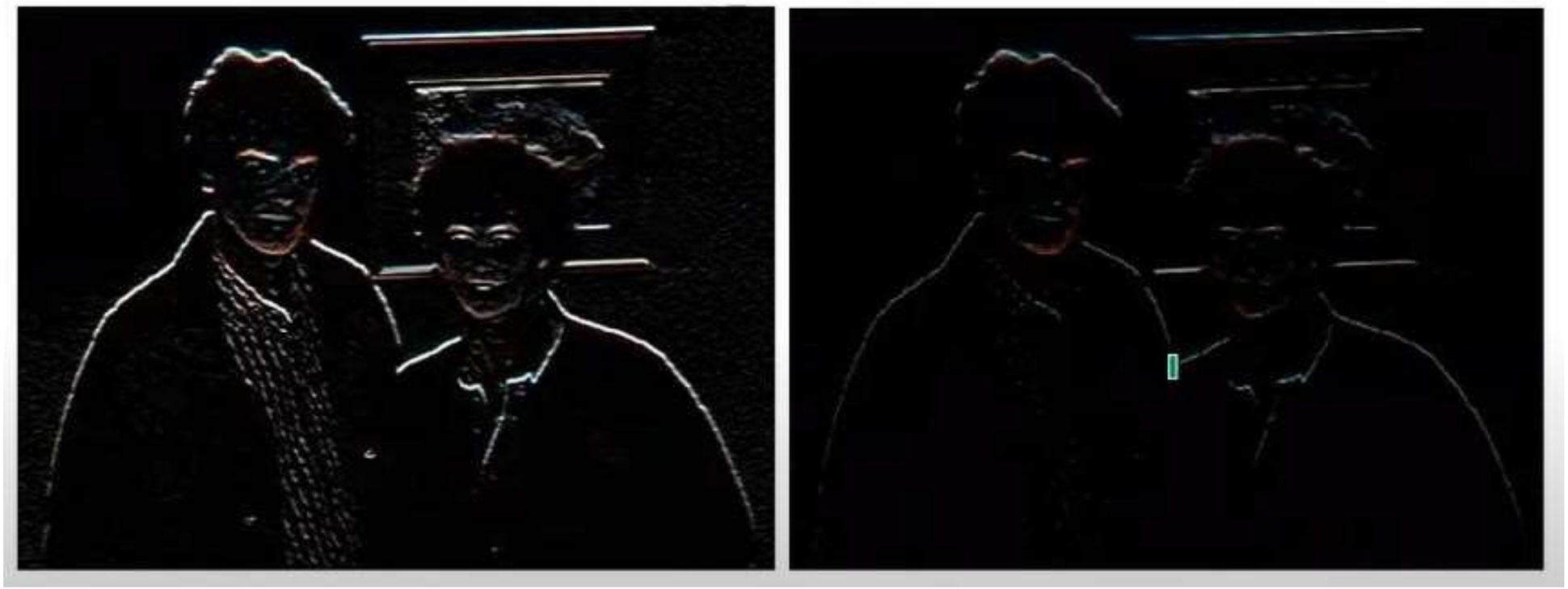




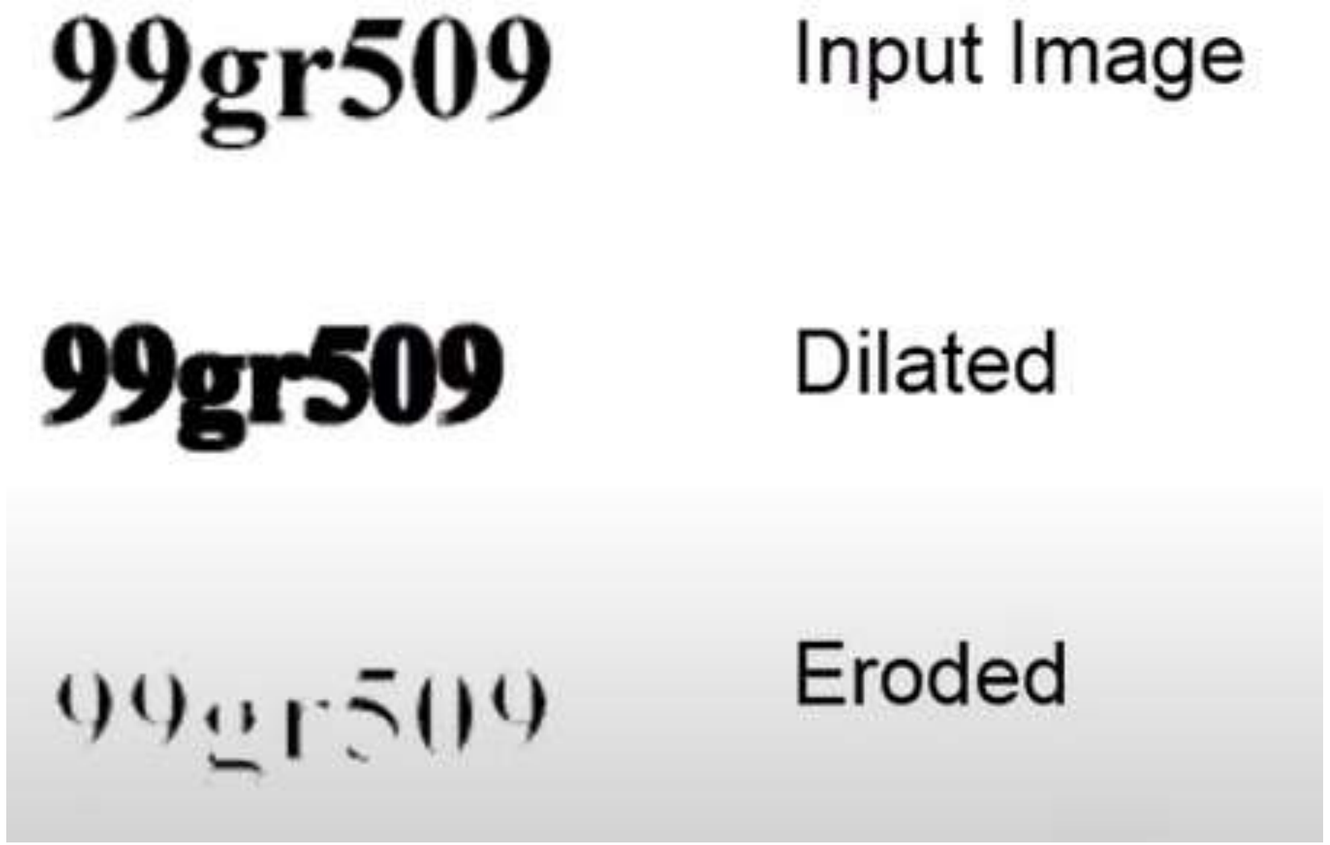
Erosion Example



Erosion Example



More Erode and Dilate Examples



Opening and Closing

Image → Dilation → Erosion

- It serves to eliminate noise

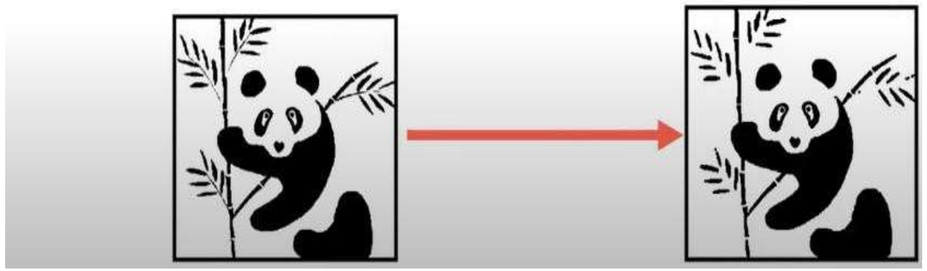
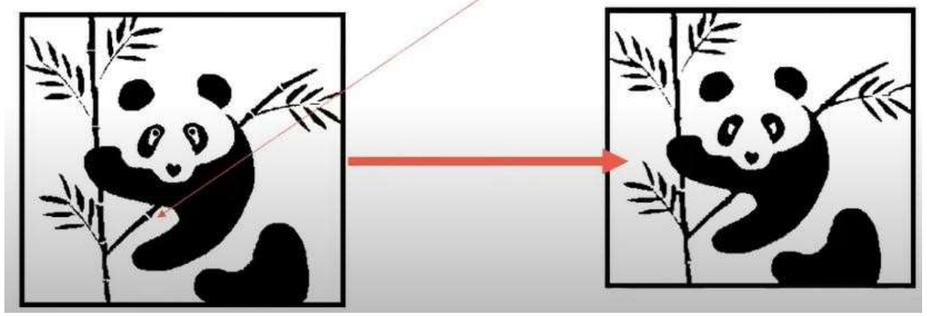
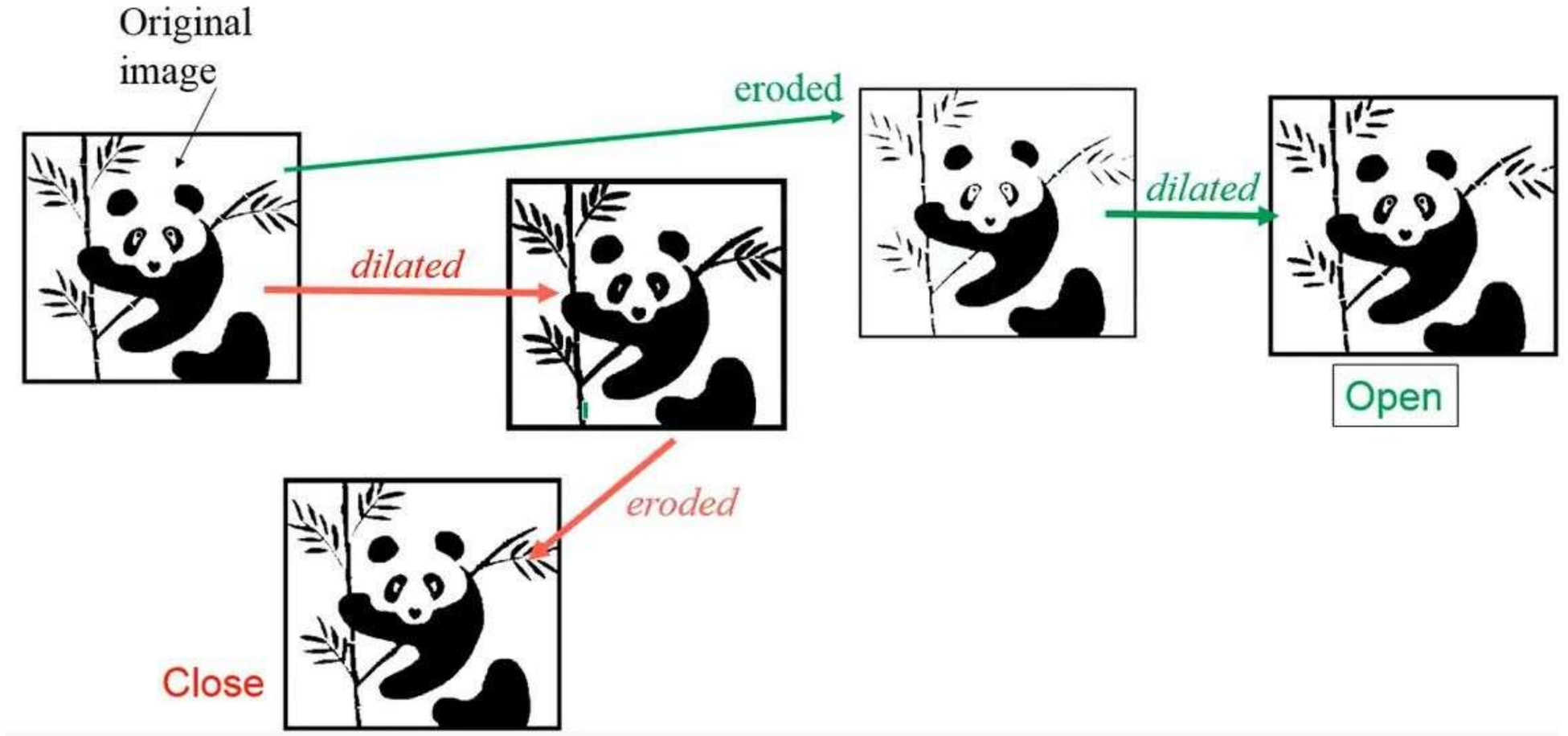


Image → Erosion → Dilation

- Serves to close up cracks in objects and holes due to pepper noise



Open and Close



Difference

- Erosion and dilation clean image but leave objects either smaller or larger than their original size.

- Opening and closing perform same functions as erosion and dilation but object size remains the same.

Thank you!