



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
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 & COMMUNICATION ENGINEERING

19ECE351 – IMAGE PROCESSING AND COMPUTER VISION

III B.E. ECE / V SEMESTER

UNIT 4 – MORPHOLOGICAL IMAGE PROCESSING

TOPIC – OPENING AND CLOSING OPERATION



OPENING AND CLOSING

Opening generally smoothes the contour of an object, and eliminates thin protrusions.

$$A \circ B = (A \ominus B) \oplus B$$

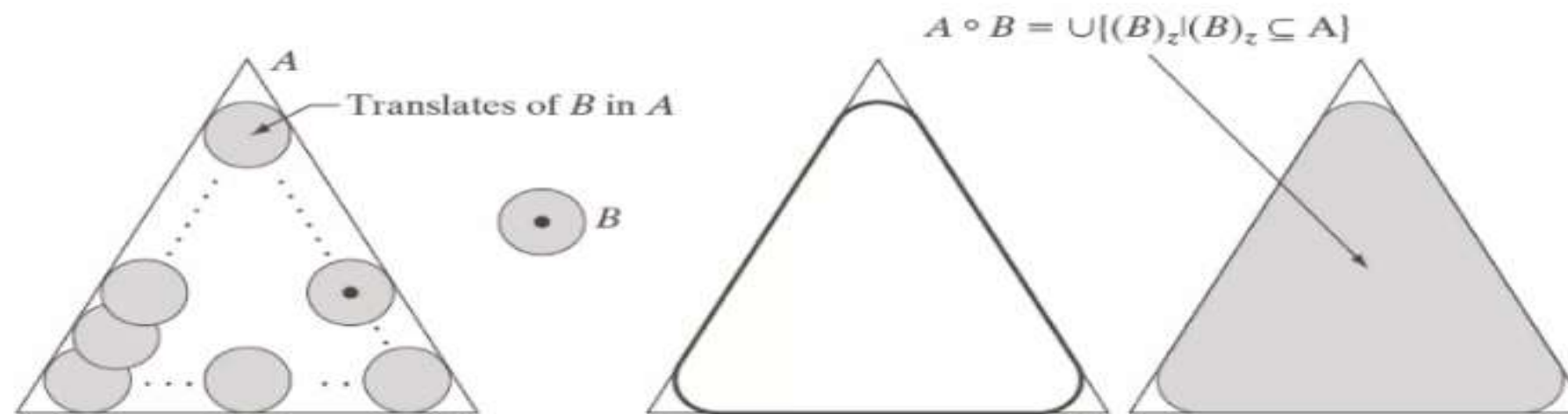
Closing also tends to smooth section of contours but, as opposed to opening, it generally fuses narrow breaks and long thin gulfs, eliminates small holes, and fills gaps in the contour.

$$A \bullet B = (A \oplus B) \ominus B$$



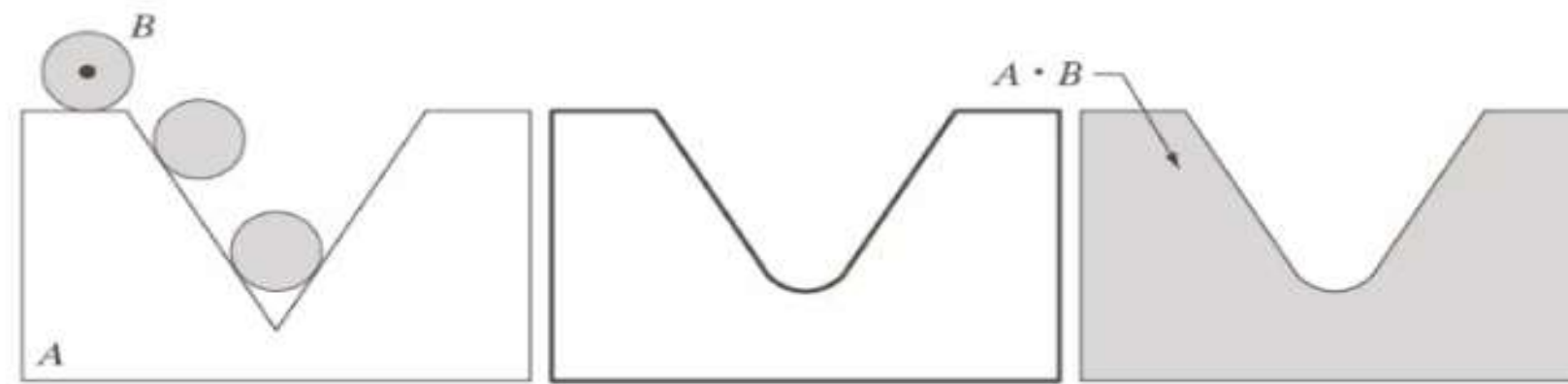
Opening

- ▣ First – erode A by B , and then dilate the result by B
- ▣ In other words, opening is the unification of all B objects Entirely Contained in A





Closing

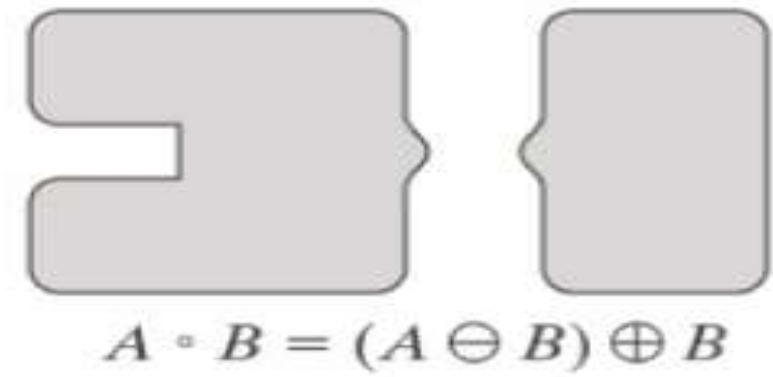
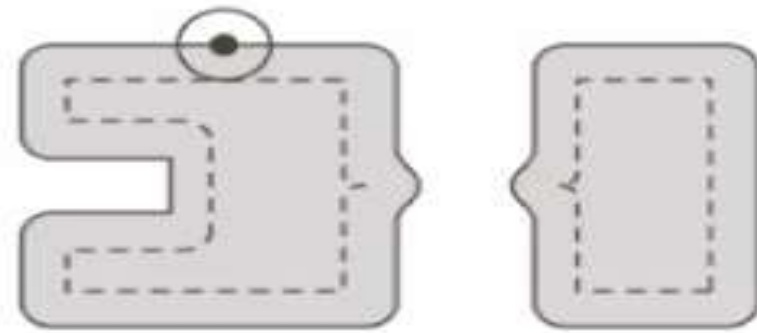
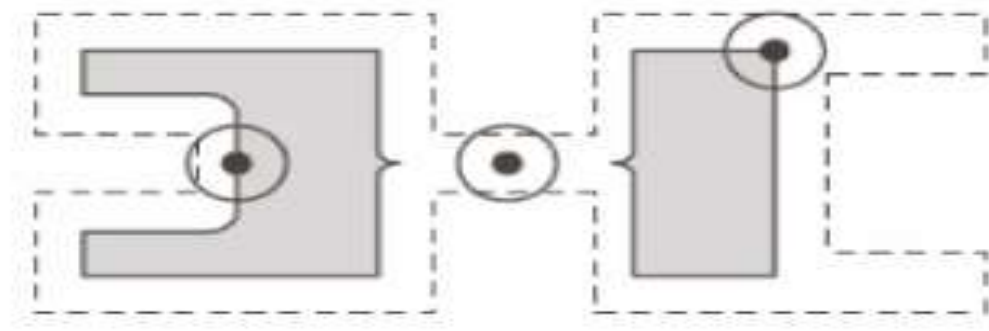
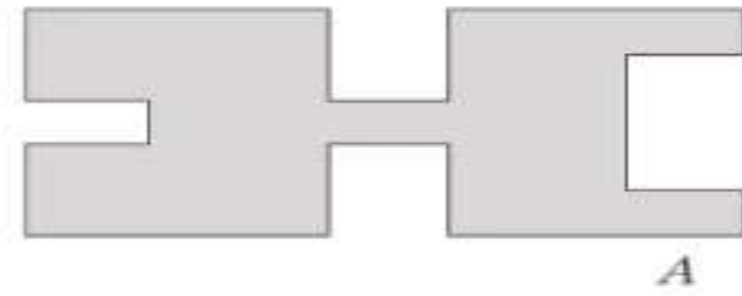


a b c

FIGURE 9.9 (a) Structuring element B “rolling” on the outer boundary of set A . (b) The heavy line is the outer boundary of the closing. (c) Complete closing (shaded). We did not shade A in (a) for clarity.

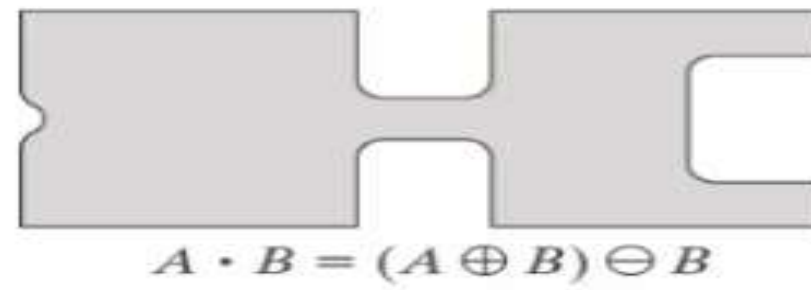
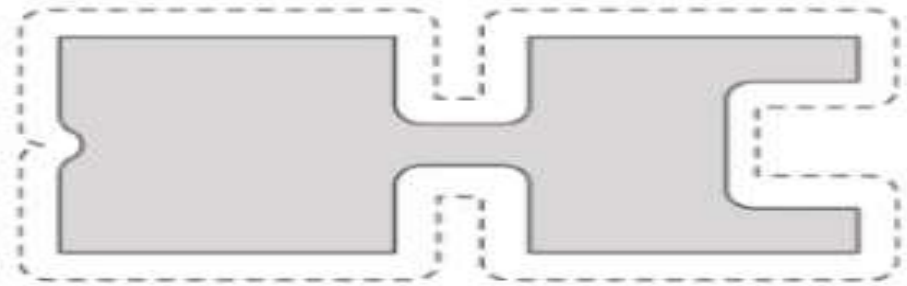
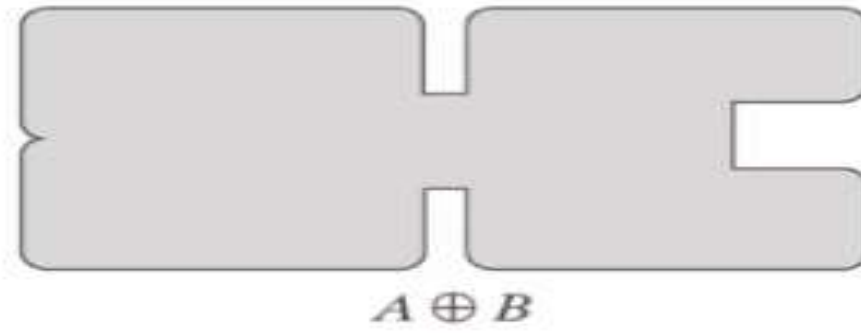
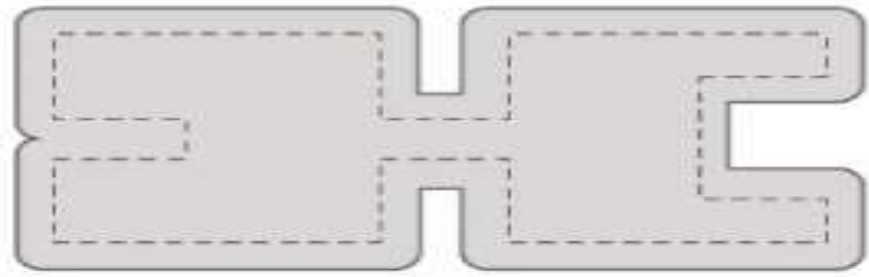


Erosion and opening



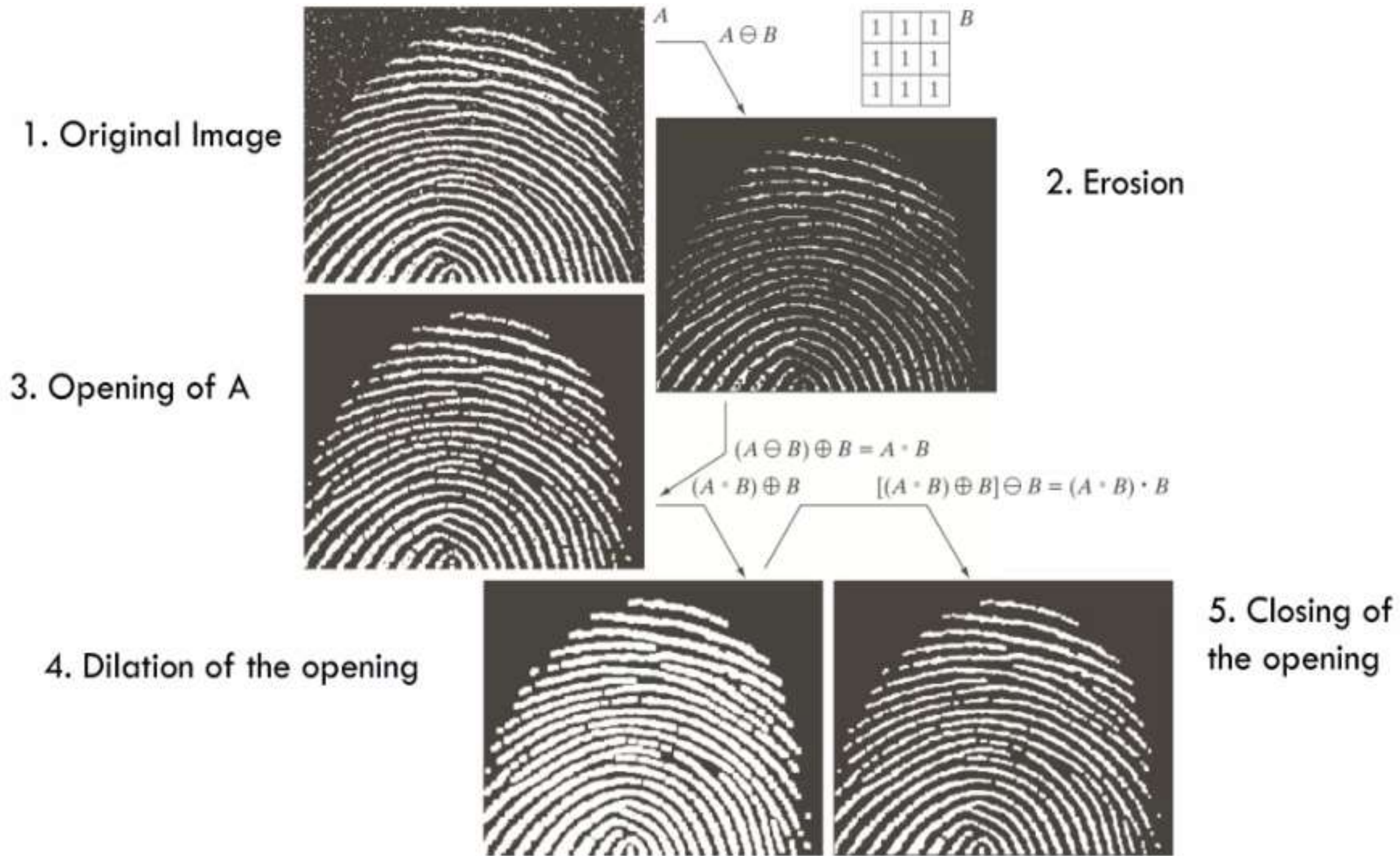


Dilation and closing





Use of opening and closing in morphological filtering





Thank
you!