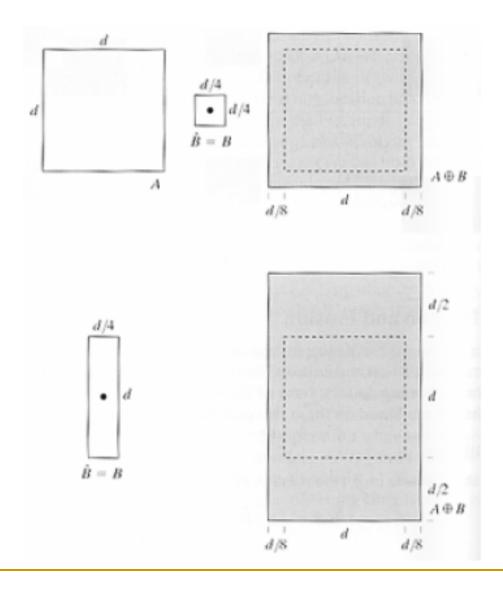
Morphological Operators

CS 111: Digital Image Processing

Dilation



Dilation: Join Broken Segments

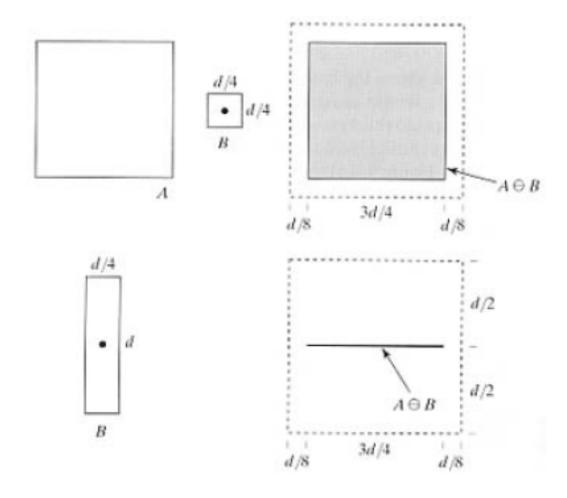
historically, certain computer programs were written using only two digits rather than four to define the applicable year. Accordingly, the company's software may recognize a date using "00" as 1900 rather than the year 2000.

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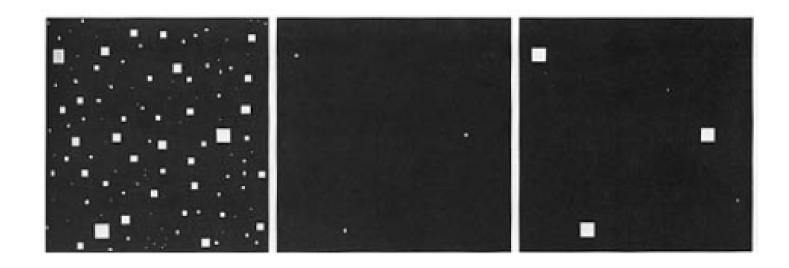
Historically, certain computer programs were written using only two digits rather than four to define the applicable year. Accordingly, the company's software may recognize a date using "00" as 1900 rather than the year 2000.

0	1	0
1	1	1
0	I	0

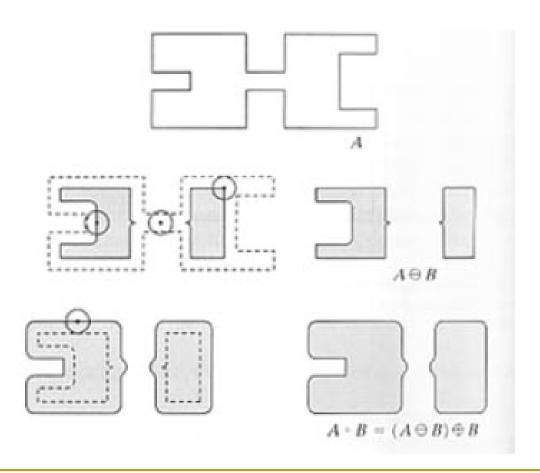
Erosion



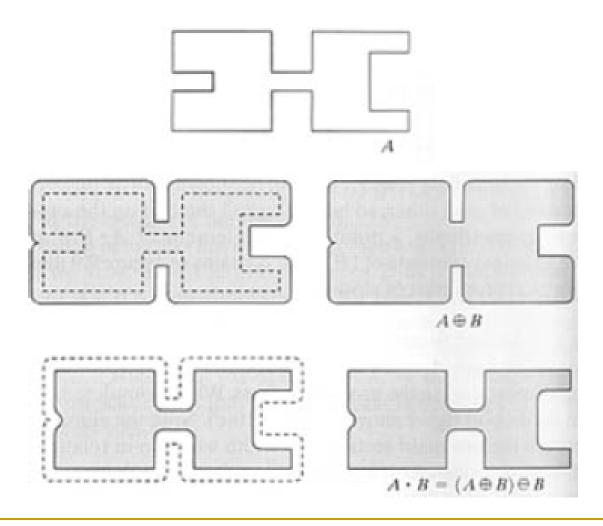
Erosion and Dilation: Eliminating Irrelevant Details



Opening



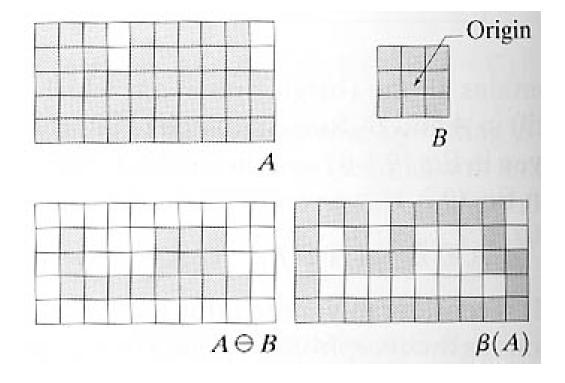
Closing



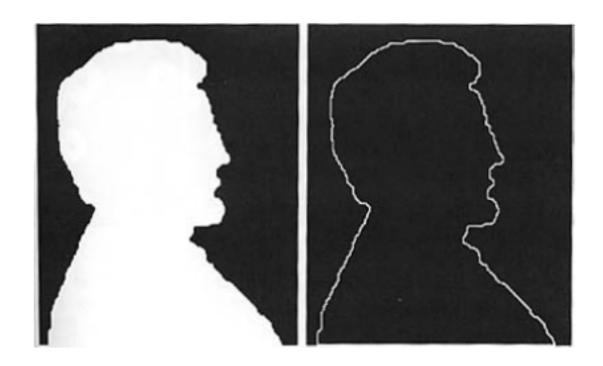
Opening and Closing: Noise Filter



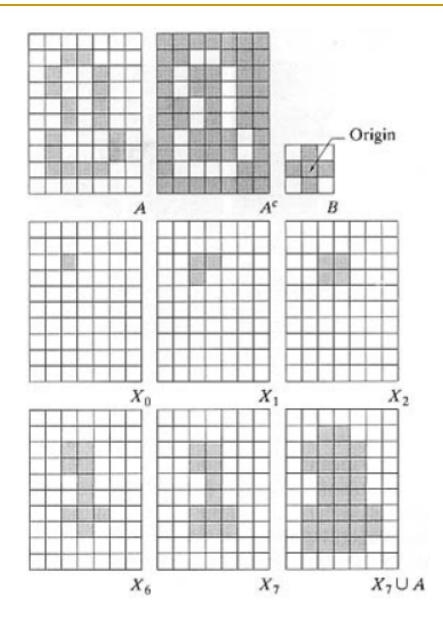
Boundary Extraction



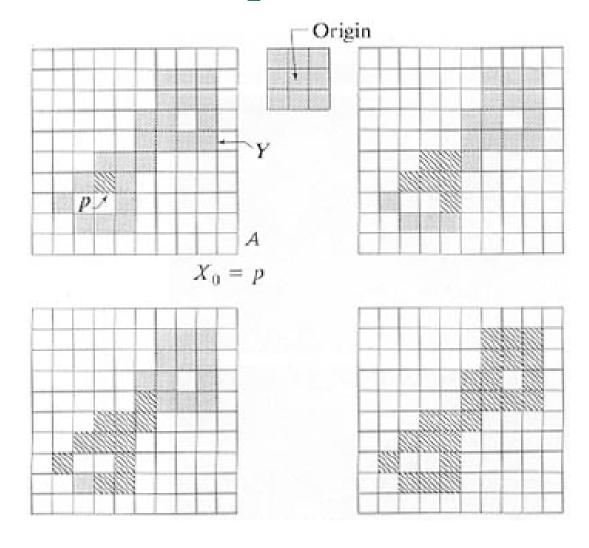
Region Filling



Region Filling



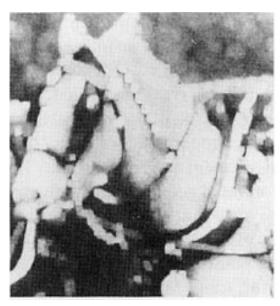
Connected Components



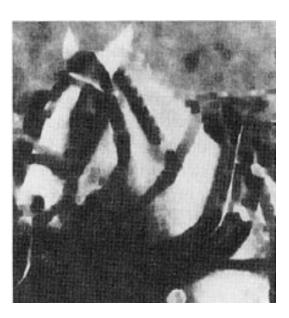
Gray Scale: Dilation and Erosion



Original



Dilation: Brighter where small dark details are reduced



Erosion: Darker where small bright details are reduced

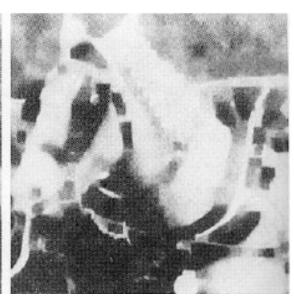
Gray Scale: Opening and Closing



Original

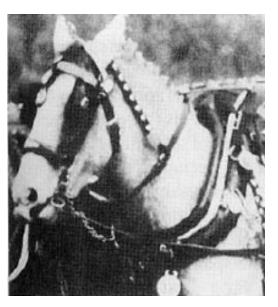


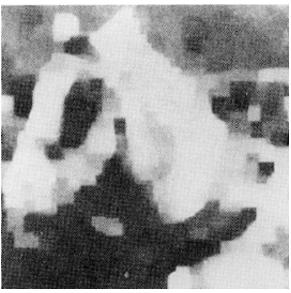
Opening: Reduces small bright details with little effect on dark areas.



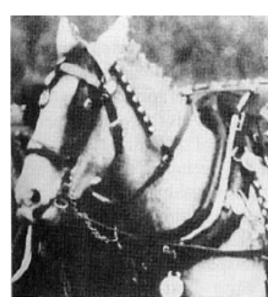
Closing: Reduces small dark details with little effect on bright areas

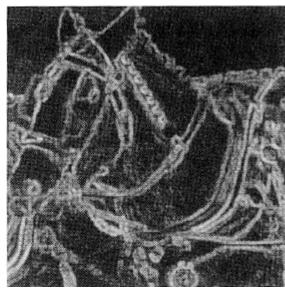
Smoothing: Opening and then Closing





Gradient: Dilation - Erosion





- Morphological Edge Detector
- Direction Independent