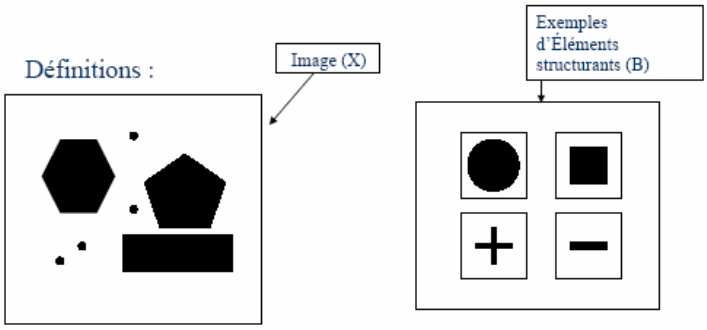
Morphologie Mathématique

Cours n°5

Caroline Petitjean

1

- Définitions :



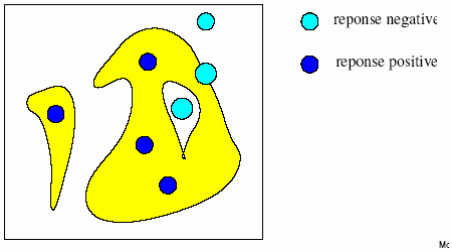
2

Notion d'ensemble appliquée à des images simples (16*4 pixels)			
Image 1	Image 2	Intersection	Union

– Vérification des relations : $X \cup X^c = E \quad et \quad X \cap X^c = 0$
  – E (Image blanche, ensemble des formes)
  – 0 (Image noire, absence totale de formes)

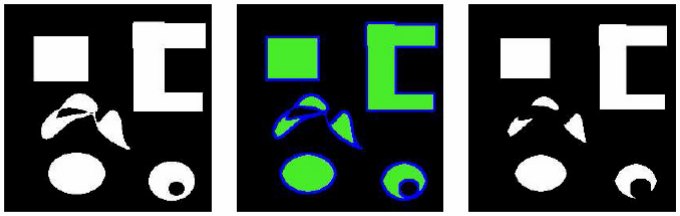
3

Erosion



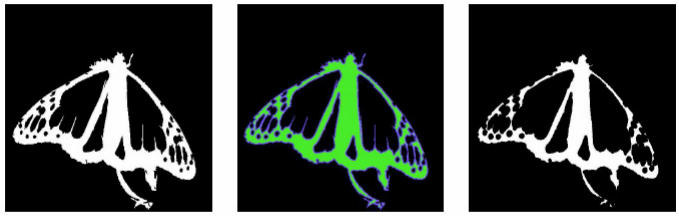
4

$B =$ ■ (rayon 3)



X $X(\blacksquare+\blacksquare)$ et $\mathcal{E}_B(X)(\blacksquare)$ $\mathcal{E}_B(X)$

$B =$ • (rayon 5)



X $X(\blacksquare+\blacksquare)$ et $\mathcal{E}_B(X)(\blacksquare)$ $\mathcal{E}_B(X)$

5

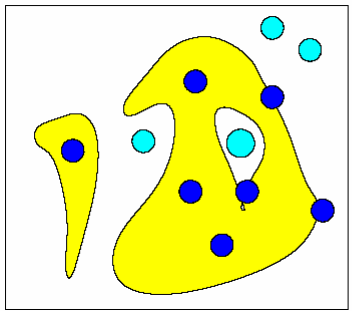
Erosion

- Taille croissante de l'élément structurant

X $\mathcal{E}_{5B}(X)$ $\mathcal{E}_{10B}(X)$ $\mathcal{E}_{15B}(X)$

6

Dilatation

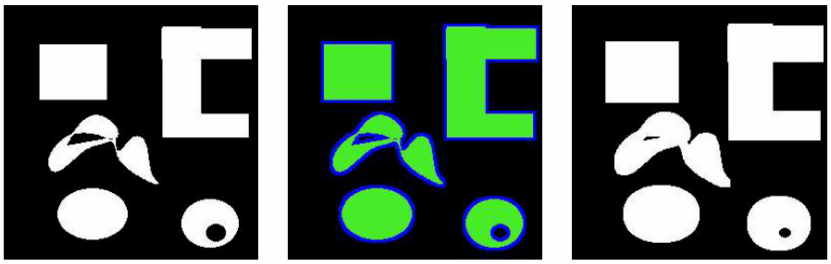


reponse negative

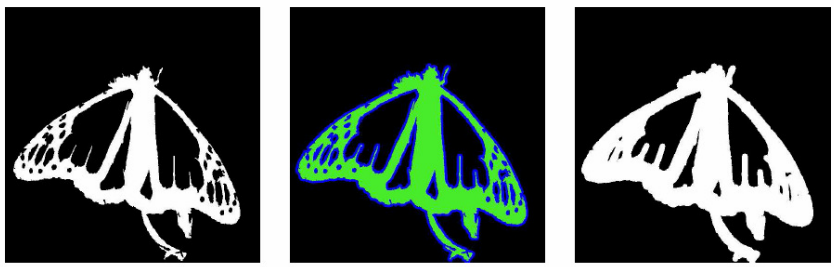
reponse positive

7

$B =$■ (rayon 3)



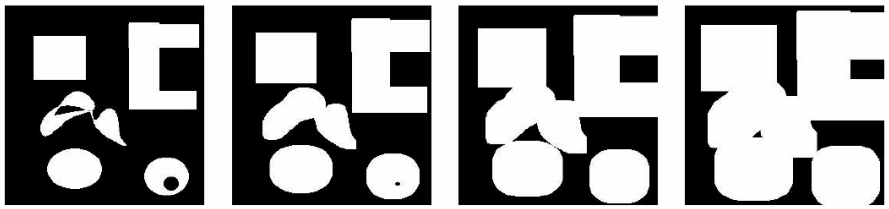
$B =$ • (rayon 5)



X $\delta_B(X)$(■+■) et$X$(■) $\delta_B(X)$

Dilatation

$B =$ ■



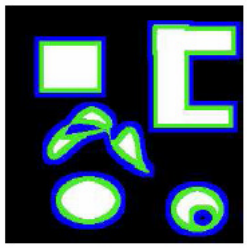
X $\delta_{5B}(X)$ $\delta_{10B}(X)$ $\delta_{15B}(X)$

Dualité

X $\delta_{5B}(X)$ $\mathcal{E}_{5B}(\mathcal{C}_E(X))$

Extensivité

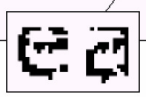
- $\mathcal{E}_B(X) = \square$
- $X = \square +$
- $\delta_B(X) = \square +$



11

Application

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.

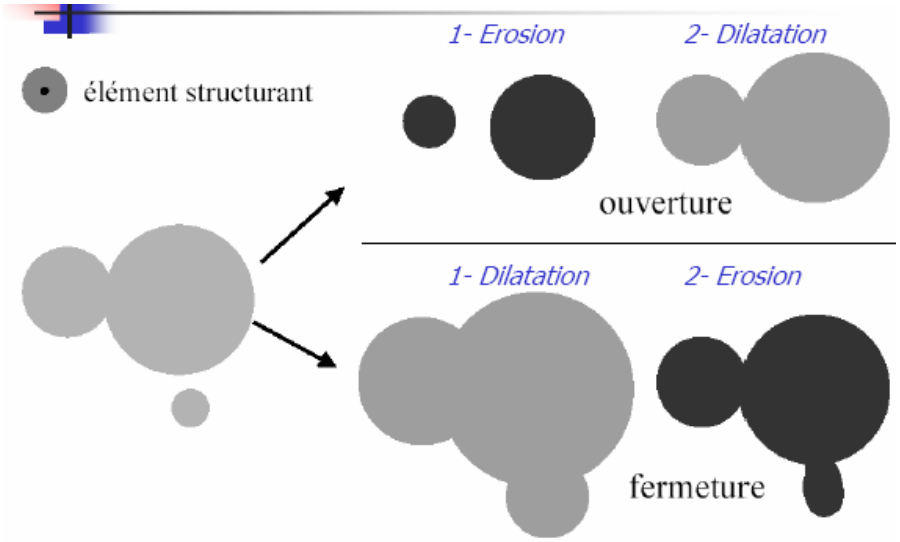


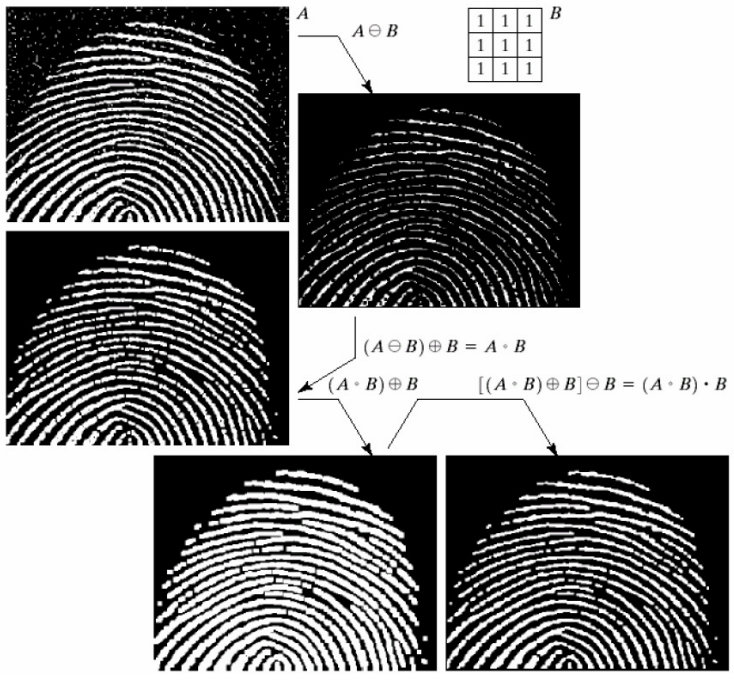
Historically, certain computer programs were written using only two digits rather than four to define the applicable year. Accordingly, the company's software may recognize a date using "00" as 1900 rather than the year 2000.

a c
b

FIGURE 9.5
(a) Sample text of poor resolution with broken characters (magnified view). (b) Structuring element. (c) Dilation of (a) by (b). Broken segments were joined.

Ouverture/Fermeture



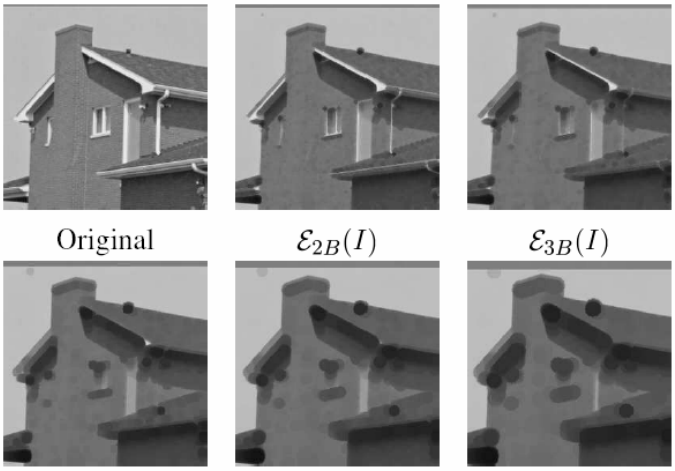


a b
d c
e f

FIGURE 9.11
(a) Noisy image.
(c) Eroded image.
(d) Opening of A.
(d) Dilation of the opening.
(e) Closing of the opening. (Original image for this example courtesy of the National Institute of Standards and Technology.)

Erosion en NdG

Erosion avec un élément structurant plat de support circulaire.

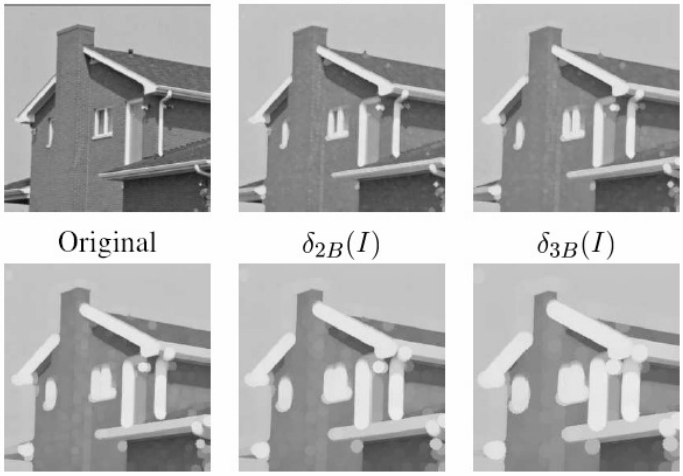


Original $\mathcal{E}_{2B}(I)$ $\mathcal{E}_{3B}(I)$

$\mathcal{E}_{5B}(I)$ $\mathcal{E}_{7B}(I)$ $\mathcal{E}_{9B}(I)$

Dilatation en NdG

- Dilatation avec un élément structurant plat, circulaire.



Original $\delta_{2B}(I)$ $\delta_{3B}(I)$

$\delta_{5B}(I)$ $\delta_{7B}(I)$ $\delta_{9B}(I)$

Gradient morphologique

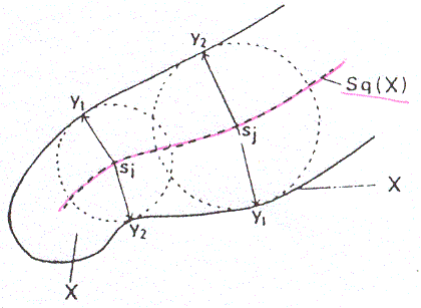
I

$\delta_B(I)$

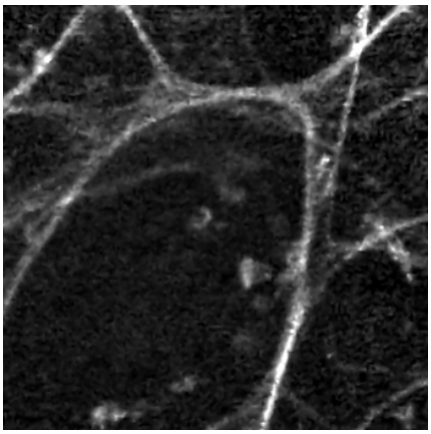
$\mathcal{E}_B(I)$

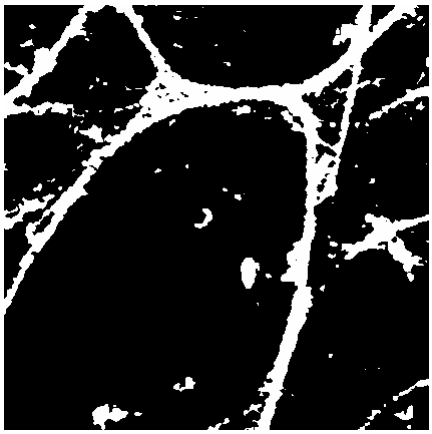
$\nabla_B^-(I)$

Squelette



Application





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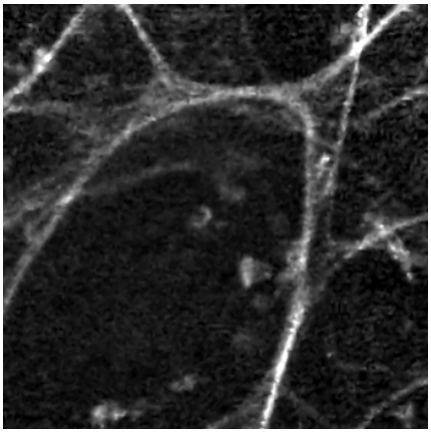
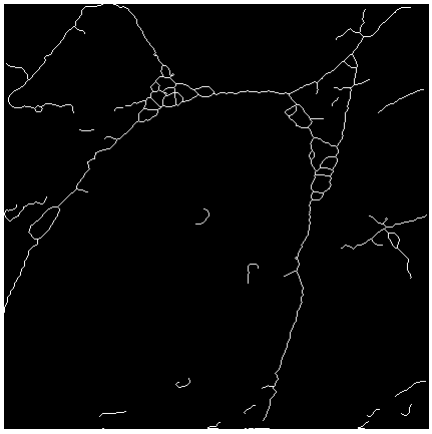
Squeletisation





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Sources

- Cours Traitement d'images, **Christophe Cudel,** Bruno Colicchio, Alain Dieterlen, Univ. Haute-Alsace
- Cours Traitement d'images, Alain Boucher, IFI

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