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 : Morphological reconstruction

Morphological Reconstruction

It involves two images and a structuring element

a.One image contains the starting points for the transformation (The image is called marker)

b. Another image (mask) constrains the transformation

c. The structuring element is used to define connectivity

Morphological Reconstruction: Geodesic Dilation

Let F denote the marker image and G the mask image, $F \subseteq G$. The geodesic dilation of size 1 of the marker image with respect to the mask, denoted by $D_G^{(1)}(F)$, is defined as

$$D_G^{(1)}(F) = (F \oplus B) \cap G$$

The geodesic dilation of size n of the marker image F with respect to G, denoted by $D_G^{(n)}(F)$, is defined as

$$D_G^{(n)}(F) = D_G^{(1)}(F)\left[D_G^{(n-1)}(F)\right]$$

with $D_G^{(0)}(F) = F$.

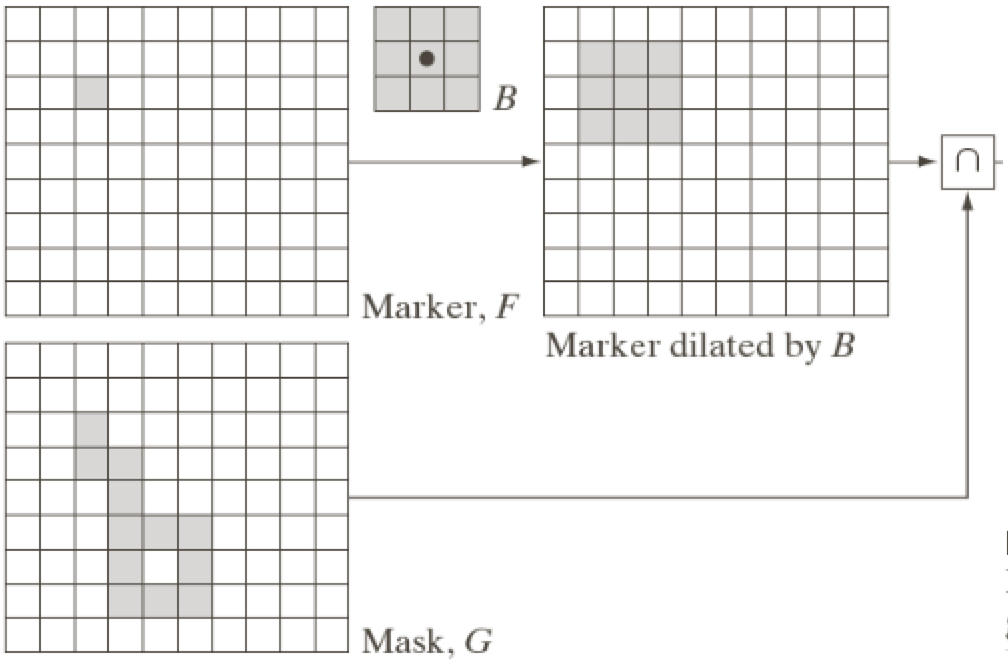


FIGURE 9.26
Illustration of geodesic dilation.

Morphological Reconstruction: Geodesic Erosion

Let F denote the marker image and G the mask image. The geodesic erosion of size 1 of the marker image with respect to the mask, denoted by $E_G^{(1)}(F)$, is defined as

$$E_G^{(1)}(F) = (F \ominus B) \cup G$$

The geodesic erosion of size n of the marker image F with respect to G, denoted by $E_G^{(n)}(F)$, is defined as

$$E_G^{(n)}(F) = E_G^{(1)}(F)\left[E_G^{(n-1)}(F)\right]$$

with $E_G^{(0)}(F) = F$.

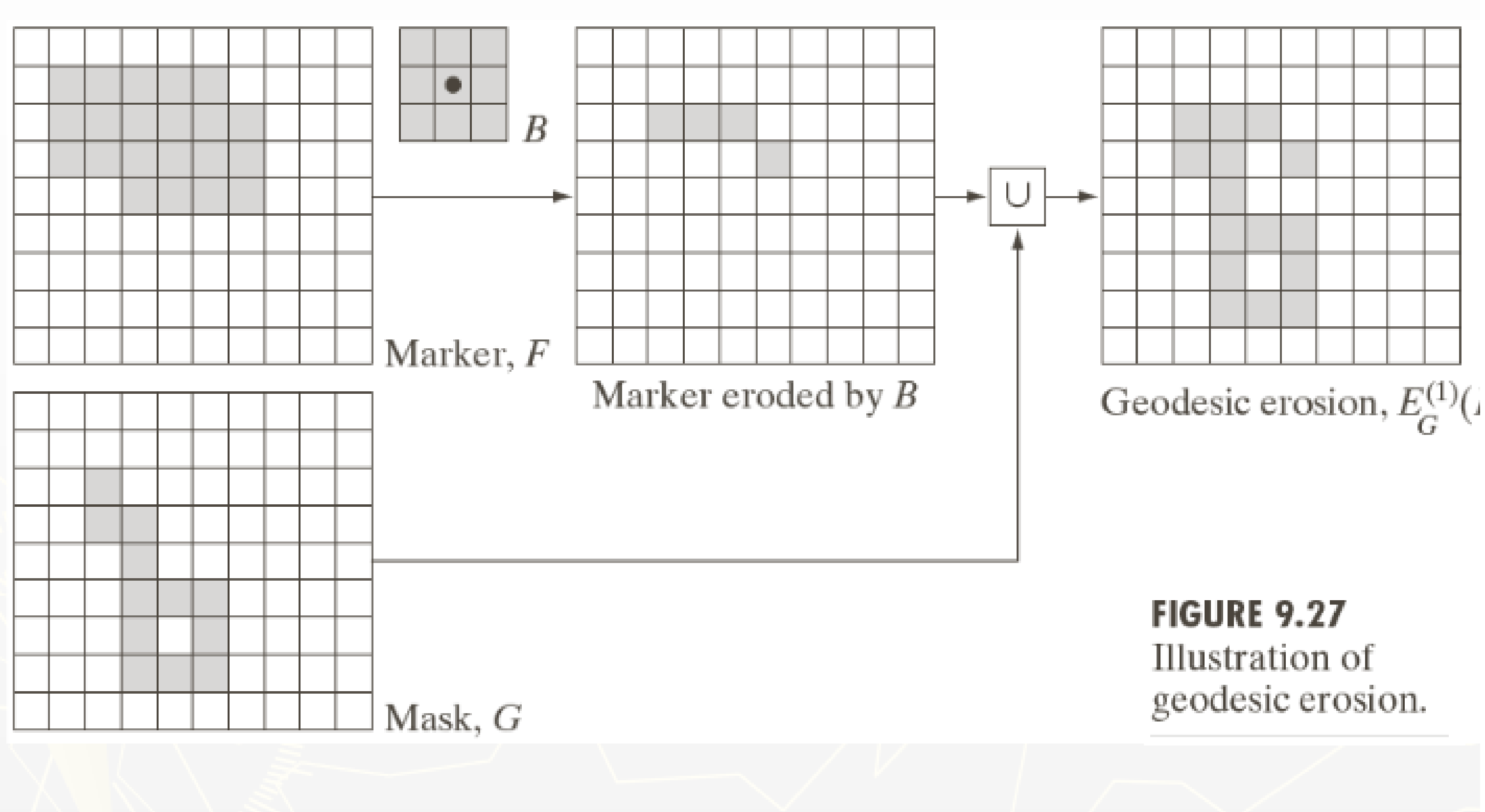


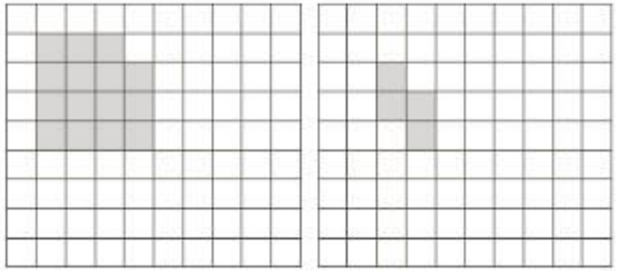
FIGURE 9.27
Illustration of geodesic erosion.

Morphological Reconstruction by Dilation

Morphological reconstruction by dialtion of a mask image G from a marker image F, denoted $R_G^D(F)$, is defined as the geodesic dilation of F with respect to G, iterated until stability is achieved; that is,

$$R_G^D(F) = D_G^{(k)}(F)$$

with k such that $D_G^{(k)}(F) = D_G^{(k-1)}(F)$.



$D_G^{(1)}(F)$ dilated by B $D_G^{(2)}(F)$

a	b	c	d
e	f	g	h

FIGURE 9.28 Illustration of morphological reconstruction by dilation. F, G, B and $D_G^{(1)}(F)$ are from Fig. 9.26.

Morphological Reconstruction by Erosion

Morphological reconstruction by erosion of a mask image G from a marker image F, denoted $R_G^E(F)$, is defined as the geodesic erosion of F with respect to G, iterated until stability is achieved; that is,

$$R_G^E(F) = E_G^{(k)}(F)$$

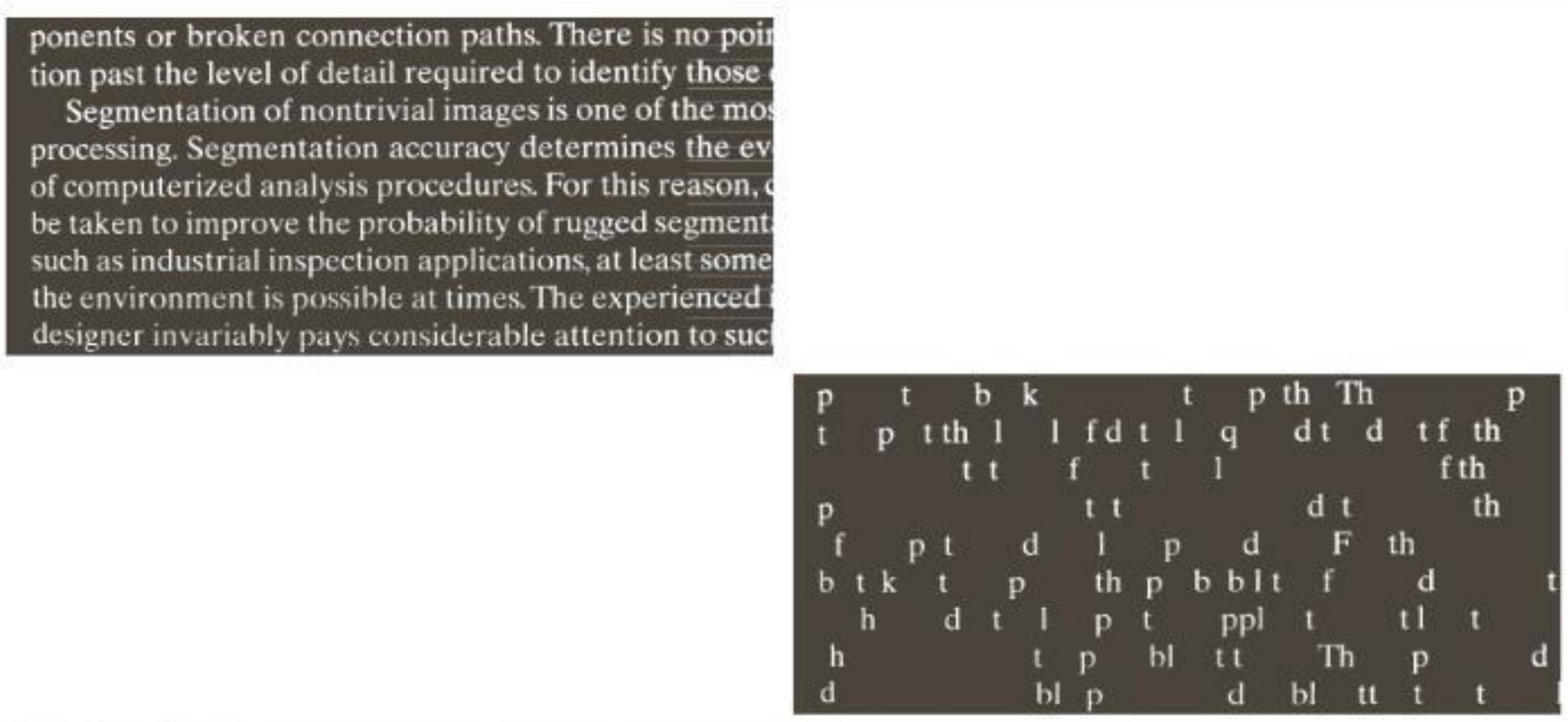
with k such that $E_G^{(k)}(F) = E_G^{(k-1)}(F)$.

Opening by Reconstruction

The opening by reconstruction of size n of an image F is defined as the reconstruction by dilation of F from the erosion of size n of F; that is

$$O_R^{(n)}(F) = R_F^D\left[(F \ominus nB)\right]$$

where $(F \ominus nB)$ indicates n erosions of F by B.


ponents or broken connection paths. There is no poi
tion past the level of detail required to identify those
Segmentation of nontrivial images is one of the mos
processing. Segmentation accuracy determines the ev
of computerized analysis procedures. For this reason,
be taken to improve the probability of rugged segment
such as industrial inspection applications, at least some
the environment is possible at times. The experienced
designer invariably pays considerable attention to suc

a b
c d

THANK YOU !!!