

set operations

binary images : $\begin{cases} 1 & \text{foreground} \\ 0 & \text{background} \end{cases}$

(se) structuring element: rectangular array of 0's & 1's

center : k odd : $(k+1)/2$

k even : $k/2$

2 basic operations: erosion + dilation

erosion : place center of se at pixel (r,c) :

$A \ominus B$ if any se element == 1
and corresponding image pixel == 0
set output at (r,c) to 0

dilation : place center of se at pixel (r,c) :

$A \oplus B$ if any se element == 1
and corresponding image pixel == 1
set output at (r,c) to 1

imerode, imdilate

also, bwmorph(im, 'erode', k);

bwmorph(im, 'dilate', k);

create se: strel

se = strel('shape', 'parameters')

see CS6640 - Week 9

opening: erosion followed by dilation

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

remove small, isolated objects

closing: dilation followed by erosion

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

remove small holes in foreground

boundary finding

$$A - (A \ominus B)$$

connected components: bwlabel

region filling: imfill

hit or miss: checks foreground match & background matches

skeletonization A point p belongs to skeleton of

foreground object A if:

- * a circle C can be centered at $p \ni$ it touches boundary of A at > 1 places
- * No larger circle lies entirely within A containing C

opening by reconstruction

set M to original image

set A to eroded original image

$$\text{set } A \leftarrow (A \oplus \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}) \cap M$$

until no change

[may need to choose specific se]