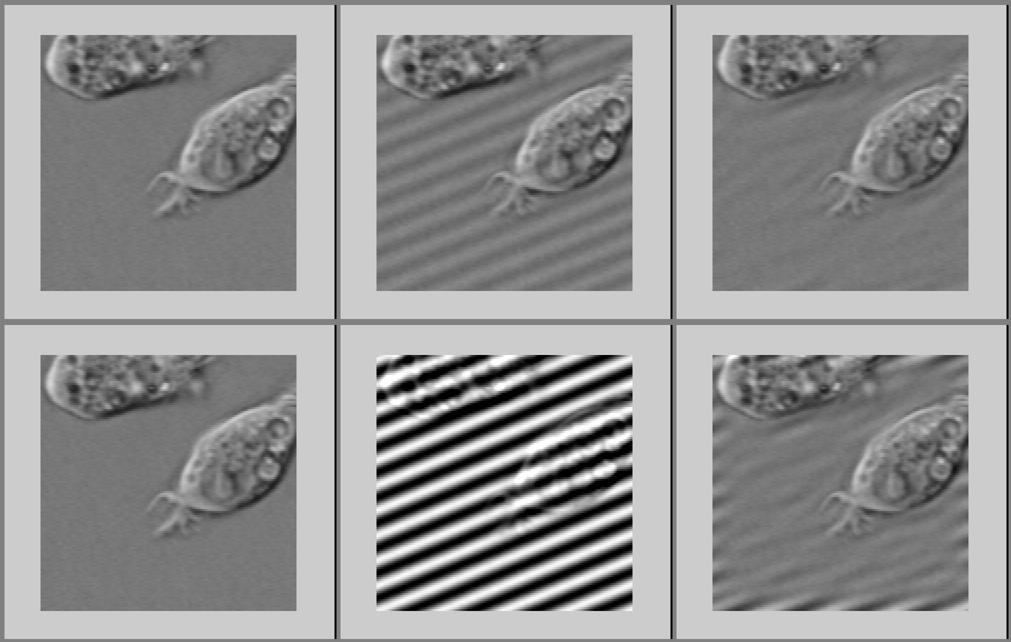
Image Processing and Analysis III



Materials extracted from Gonzalez & Wood
and Castleman

Image Segmentation –
Boundary based Threshold and Region Filling II

(3) Region Filling

Assign all boundary points to zero.
Identify a point P inside the boundary, the region can be filled by iterative application to neighboring points of:

$$X_k = (X_{k-1} \oplus B) \cap A^c$$

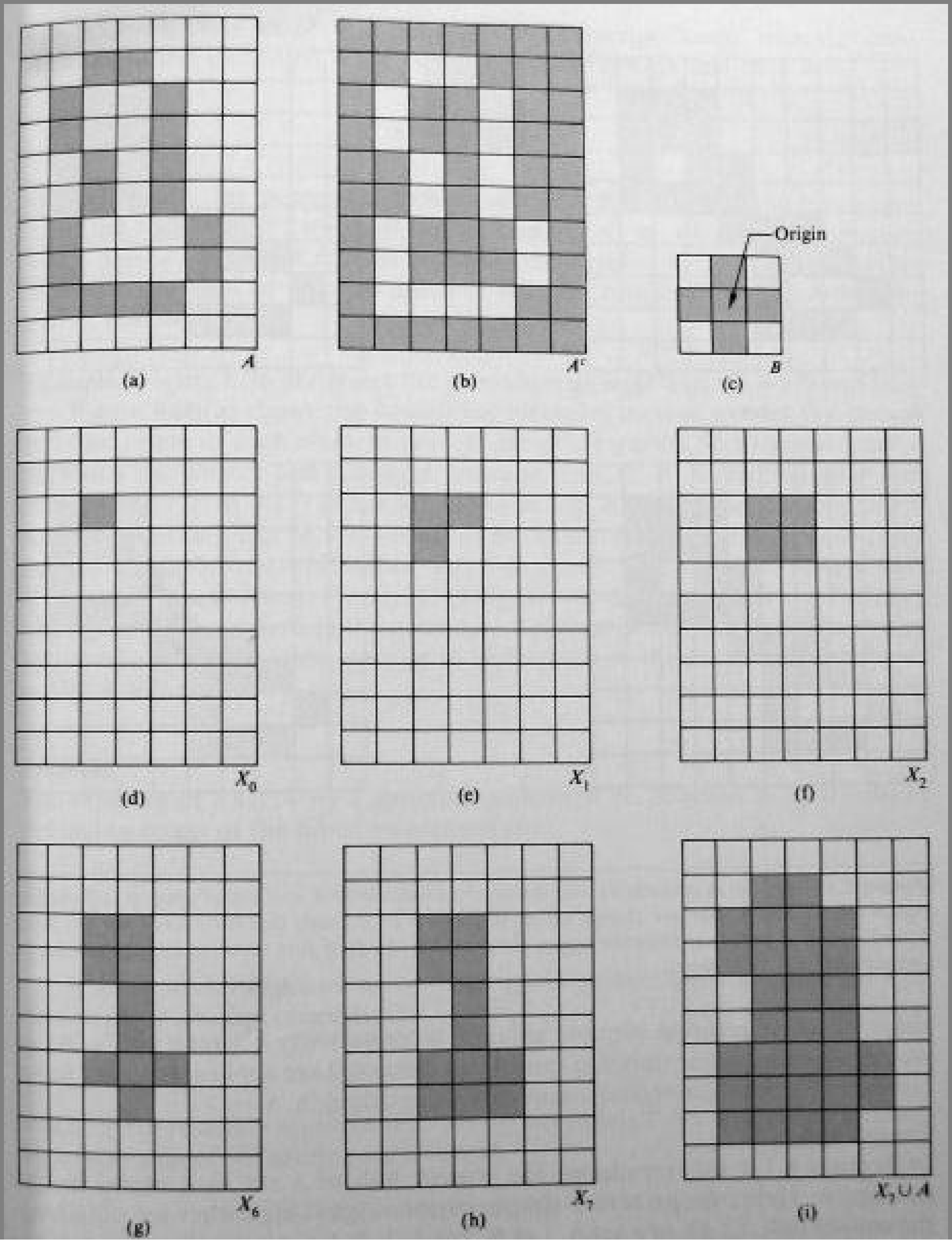


Image Segmentation –
Region Growing by Pixel Aggregation

Basic idea: Selected a number of “seed” pixels in the image. Find neighbors that are similar in value. Aggregate similar value pixels into a region. Merge regions with similar values. Add more seeds as necessary until all the picture is filled.

	1	2	3	4	5
1	0	0	5	6	7
2	1	1	5	8	7
3	0	1	6	7	7
4	2	0	7	6	6
5	0	1	5	6	5

(a)

a	a	b	b	b
a	a	b	b	b
a	a	b	b	b
a	a	b	b	b
a	a	b	b	b

(b)

Threshold 3

a	a	a	a	a
a	a	a	a	a
a	a	a	a	a
a	a	a	a	a
a	a	a	a	a

(c)

Threshold 8

Image Classification and Recognition I

Image recognition is the problem of classifying patterns. Pattern classes can be Denoted by M classes: $\omega_1, \omega_2, \omega_3 ... \omega_M$

Recognition problem is relatively straightforward if each class can be distinctly described by some measurable characteristics denoted by the pattern vector x={x1, x2, x3, ….}

Example, classify images of three type of iris flowers (setosa (ω_1), virginica (ω_2), and versicolor (ω_3)) by their petal width (x1) and petal length (x2)

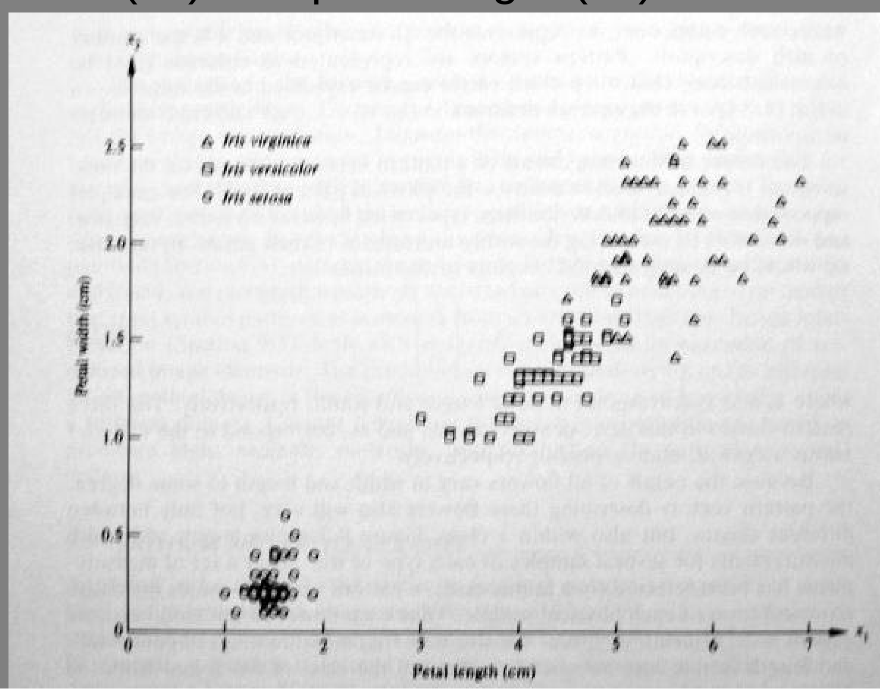


Image Classification and Recognition II

We can define a n dimensional characteristic vector for each class i:

$$\vec{X}_i = \{X_i^1 \cdots X_i^n\}$$

We can define M distances of a pattern found in the image to each defined class:

$$d_i = \sqrt{\sum_j^n (x^j - X_i^j)^2}$$

Where $\vec{x} = \{x^1 \ldots x^n\}$ is the pattern vector of the pattern in question

Then the pattern before to class ω_i if:

$$d_i(\vec{x}) < d_j(\vec{x}) \quad j = 1,2,\ldots,M;\ j \neq i$$