

The background is a solid blue color. Overlaid on this are several abstract elements: a large, dark blue, organic, wavy shape that occupies the center and right side of the frame; a network diagram consisting of white nodes (small circles) connected by thin white lines, some of which are curved, creating a web-like structure across the image; and several solid dark blue circles of varying sizes scattered around the edges. The title 'Region Growing' is written in a large, white, sans-serif font, centered horizontally and partially overlapping the dark blue organic shape.

# Region Growing

Region-based Segmentation

# Region Growing

Grouping of pixels or subregions into larger regions

Predefined criteria of growth

Seed pixels

Neighbourhood analysis based on predefined properties similar to seed pixel

# Selection of Seed pixel

Prior information is not available then,  
Compute the properties at every pixel in the whole image.

If computation results in clusters of values, the pixel at centroid shall be choose as Seed pixel.

Use of Descriptors (Color, texture etc.) in selecting Seed pixel and later region growing.  
Importance of connectivity along with descriptor.

# Stopping rule

No more pixels satisfy the criteria of region growth.

Intensity, texture, color are local features and therefore shall not be used.

Likeness between the candidate pixel and the pixels grown so far.

Shape of the region.

Model of expected results is at least partially available.

# Basic algorithm

1. Find all connected components in  $S(x,y)$  and erode each connected component to one pixel; label all such pixels found as 1. All other pixels in  $S$  are labelled 0.
2. Form an image  $f_Q$  such that, at a pair of coordinates  $(x,y)$ , let  $f_Q(x,y) = 1$  if the input image satisfies the given predicate,  $Q$ , at those coordinates; otherwise, let  $f_Q(x,y) = 0$ .
3. Let  $g$  be an image formed by appending to each seed point in  $S$  all the 1-valued points in  $f_Q$  that are 8-connected to that seed point.
4. Label each connected component in  $g$  with a different region label (e.g., 1,2,3,...). This is the segmented image obtained by region growing.

# Region Growing

$$Q = \begin{cases} \text{TRUE} & \text{if the absolute difference of the intensities} \\ & \text{between the seed and the pixel at } (x, y) \text{ is } \leq T \\ \text{FALSE} & \text{otherwise} \end{cases}$$

