









Applications of Segmentation

- Object recognition
- MPEG-4 video compression

Object Recognition Using Region Properties

• Training

- For all training samples of each model object
 - Segment the image
 - Compute region properties (features)
- Compute mean feature vector for each model object

• Recognition

- Given an image of unknown object,
 - segment the image
 - compute its feature vector
 - match the vector to all possible models to determine its identity.

Object-Based Compression (MPEG-4)

- Advantages of OBC
 - large increase in compression ratio
 - allows manipulation of compressed video (inserting, deleting and modifying objects)
- How does it work?
 - Find objects (Object Segmentation)
 - code objects and their locations separately
 through masks or splines
 - Build mosaics of globally static objects
 - Render scene at receiver





Steps in Seed Segmentation Using Histogram Compute the histogram of a given image. Smooth the histogram by averaging peaks and valleys in the histogram. Detect good peaks by applying thresholds at the valleys. Segment the image into several binary images using thresholds at the valleys. Apply connected component algorithm to each binary image find connected regions.

Improving Seed Segmentation

- Merge small neighboring regions
- Split large regions
- Remove weak boundaries between adjacent regions

Split and Merge

- Split region *R* into four adjacent regions (quadrants) if *Predicate*(*R*) = *false*.
- 2. Merge any two adjacent regions R_1 and R_2 if $R_1 U R_2 = true$.
- 3. Stop when no further merging and splitting are possible.





















Edge Detection Vs Region Segmentation

- Region segmentation results in closed boundaries, while the boundaries obtained by edge detection are not necessarily closed.
- Region segmentation can be improved by using multi-spectral images (e.g. color images), however there is not much an advantage in using multi-spectral images in edge detection.
- The position of a boundary is localized in edge detection, but not necessarily in region segmentation.