Subdivide an image initially into a set of arbitrary, disjoint regions and then merge and/or split regions.

Quadtree Splitting

Given: Image R
Predicate Q

Approach: Subdivide R successively into smaller and smaller quadrant regions such that for any region R_i, $Q(R_i) = TRUE$.

Start with entire region.
If $Q(R) = FALSE$ divide into quadrants
Recurse on the quadrants.

Has convenient representation: quadtree
each node has 4 descendants

Figure 10.52

Observation: can result in adjacent regions with identical properties.

→ Allow merging

Merge adjacent regions R_j and R_k if $Q(R_j \cup R_k) = TRUE$.

Algorithm:
on slide
1. Split into 4 disjoint regions any region R_i for which $Q(R_i) = FALSE$
2. When no further splitting is possible, merge any adjacent regions R_j and R_k for which $Q(R_j \cup R_k) = TRUE$.
3. Stop when no further merging is possible.

Fig. 10.53   Predicate $Q = \begin{cases} TRUE & \text{if } \sigma > a \text{ AND } 0 < m < b \\ FALSE & \text{otherwise} \end{cases}$