Region Growing:

Region growing is a procedure that groups pixels or subregions into larger regions based on predefined criteria for growth. The basic approach is to start with a set of 'seed' points and from these we grow regions by appending to each seed those neighboring pixels that have similar predefined properties to the seed.

When a prior information is not available, the procedure is to compute at every pixel the same set of properties that ultimately will be used to assign pixels to regions during the growing process. If the result of these computations shows clusters of values, the pixels whose properties

Place them near the centroid of the clusters can be used as seeds.

A basic region-growing algorithm based on 8-connectivity may be stated as follows:

Step 1: Find all connected components in $S(x,y)$ and reduce each connected component to one pixel; label all such pixels found as 1 and all other pixels as 0.

Step 2: Form an image f_Q such that, at a pair of co-ordinates (x,y), let $f_Q(x,y) = 1$ if the input image satisfies the given predicate Q at those co-ordinates otherwise let $f_Q(x,y) = 0$

Step 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.

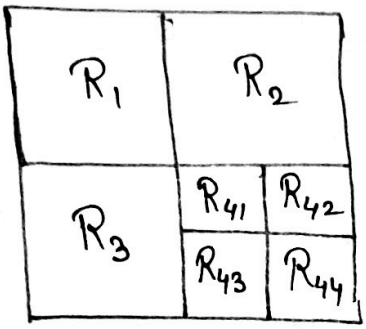
Step 4: Label each connected component in g with the different region label. This is the segmented image obtained by region growing.

Region Splitting and Merging:

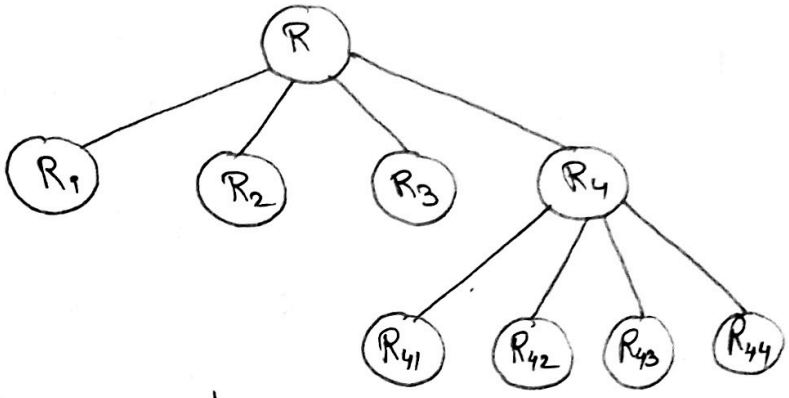
The Splitting and Merging based Segmentation methods use two basic techniques done together in conjuction - region splitting and region merging. Splitting involves iteratively dividing an image into regions having similar characteristics and merging involves combining the adjacent regions that are somewhat similar to each other.

A region split considers the entire input image as the area of interest. The process of merging,

which after each split compares adjacent regions and if required based on similar degree it merges them. Such algorithm are called split - merge algorithm.



Patitioned / Splitted Image



Corresponding quadtree R representing the entire image region

The process of split and merge can be summarized in the following steps.

Step 1: Split into four disjoined quadrants any region R_i for which $Q(R_i)$ = False.

Step 2: When no further splitting is possiable merge any adjacent regions R_j and R_k for which $(R_j \cup R_k)$ = True.

Step 3: Stop when no further merging is possiable.