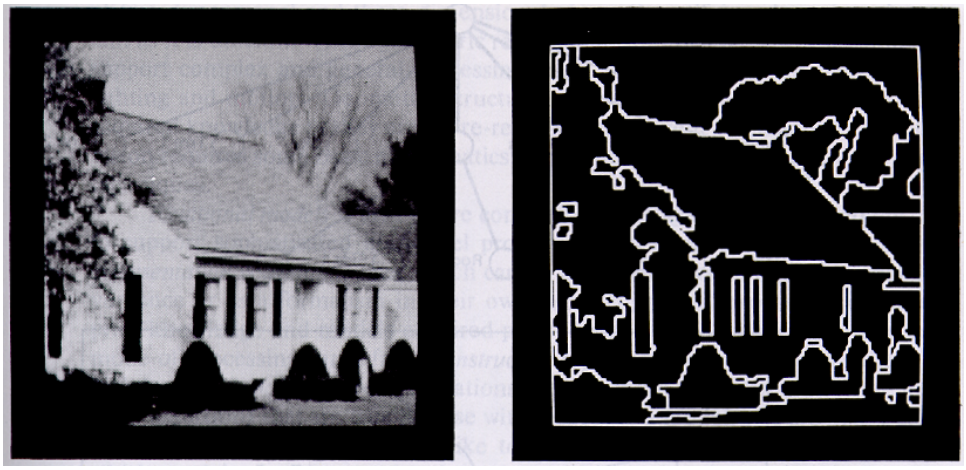
Region Detection

- A region is a group of connected pixels with similar properties.

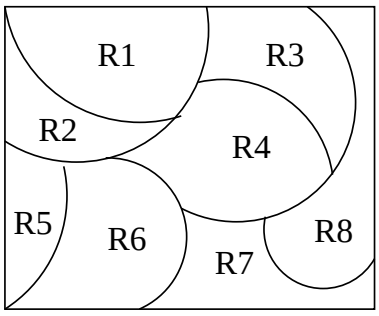
- Region-based approaches use *similarity* and *spatial proximity* among pixels to find different regions.

- The goal is to divide the image into regions, each of which is homogeneous in some sense, but the union of no two adjacent regions is homogeneous in the same sense.



• Properties for region-based segmentation

- Partition an image R into sub-regions R_1, R_2,..., R_n



- Suppose $P(R_i)$ is a logical predicate, that is, a property that the pixel values of region R_i satisfy (e.g., the gray level values are between 100 and 120).

- The following properties must hold true:

(1) $R_1 \cup R_2 \cup \cdots \cup R_n = R$

(2) R_i is connected

(3) $R_i \cap R_j = empty$

(4) $P(R_i)$ = True (P() is a predicate)

(5) $P(R_i \cup R_j)$=False

• Main approaches for region detection

- Thresholding (pixel classification)

- Region growing (splitting and merging)

- Relaxation