

Definition of Image Segmentation

An image can be portioned into many regions $R_1, R_2, R_3 \dots R_n$

$R = \textcircled{7}$

R_1 ✓	R_{21}	R_{22}
	R_{23}	R_{24}
R_3	R_4	

Example

5x5

10	10	20	20	20
10	10	20	20	20
10	10	20	20	20
30	30	20	20	20
30	30	20	20	20

R_1 (rows 1-3), R_2 (rows 4-5), R_3 (column 3)

10	10	20	20	20
10	10	20	20	20
10	10	20	20	20
30	30	20	20	20
30	30	20	20	20

Regions are color-coded: yellow for 10, blue for 30, and green for 20.

R1	R3
R2	

Characteristics of Segmentation Process

Let **R** represent the entire image region **and**
Segmentation is partitioning R into **n** subgroups R_i

- ✓ $\bigcup_{i=1}^n R_i = R$ $i = 1, 2, \dots, n$ \textcircled{R}
- ✓ R_i should be connected region : $i = 1, 2, 3, \dots, n$
- ✓ $R_i \cap R_j = \emptyset$ (for all i and j): $i \neq j$
- ✓ $P(R_i) = \text{TRUE}$ for $i = 1, 2, 3, \dots, n$
- ✓ $P(R_i \cup R_j) = \text{FALSE}$ for $i \neq j$

Here $P(R_i)$ is a **predicate** that indicates **some property over the region**

