

Pattern Recognition And Image Processing

Notes For Final Exam

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1 Define segmentation and its application.

Ans: Segmentation is the process which subdivides an image into its constituent regions or objects.

Two types of segmentation based on
(i) Discontinuity and (ii) similarity.

Application

- i) Industrial inspection
- ii) Autonomous target acquisition.
- iii) To detect object.
- iv) Finding target in satellite image.
- v) Summarizing video.

2 Write down the Edge linking algorithm.

Ans: In edge linking algorithm, there are 3 steps -

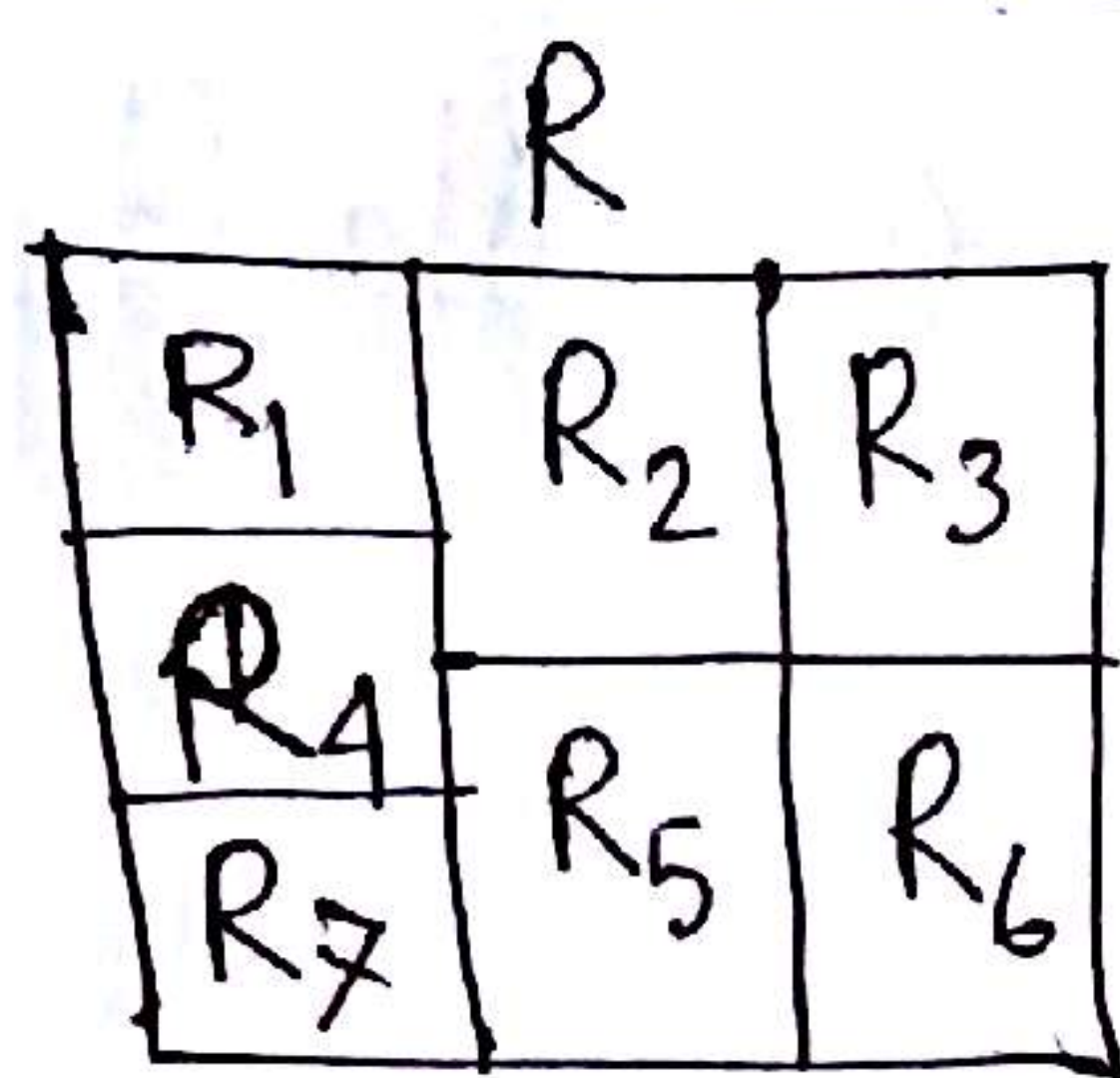
- (i) Apply edge detection algorithm such as prewitt, sobel, robert, laplacian or operator.
- (ii) Calculate the similar point
- (iii) Link the similar point.

There are three types of similarity—

- i) Similarity in magnitude.
- ii) Similarity in angle.
- iii) Both similar in magnitude and similar in angle.

3 what is the basic formulation of a region.

Ans:



$$(i) \bigcup_{i=1}^n R_i = R$$

(ii) R_i is a connected region, where $i=1,2,3,\dots,n$

(iii) $R_i \cap R_j \neq \emptyset$ where $i \neq j$ and $i,j=1,2,3,\dots,n$

(iv) $P(R_i) = \text{true}$ for $i=1,2,\dots,n$

(v) $P(R_i \cup R_j) = \text{false}$ for $i \neq j$ and $i,j=1,2,\dots,n$

4 Define global, local and adaptive thresholding. or

Ans: Global thresholding: describe segmentation based on thresholding.

Global thresholding choose threshold T that separates object from background.

Local thresholding:

Local thresholding divide in to regions.

Peruform thresholding independently in each region.

Adaptive thresholding:

Every pixel in image is thresholded according to the histogram of the pixel neighborhood.

[5] Describe the region oriented segmentation.

Ans: Region oriented segmentation is a technique for determining the region directly.

Two types of region oriented segmentation.

1) Region growing:

Region growing is a procedure that groups pixels or sub regions into larger regions.

2) Region splitting and merging:

- Divide total image in four parts.

- Divide them again and again until find similar pixel in two region besides each other.

- Then merge two region in one.

6] Write concept of motion oriented segmentation.

Ans: Motion oriented segmentation used to take the difference between a reference image and a subsequent image to determine the ~~station~~ stationary elements and non stationary image components.

It is used in robotic application, autonomous navigation and in dynamic scene analysis.

7] Write down the fundamental steps in edge detection.

Ans: Fundamental steps in edge detection -

(i) Smoothing:

Suppress as much as noise as possible, without destroying true edges.

(ii) Enhancement:

Apply differentiation to enhance the quality of edges.

(iii) Thresholding:

Determine which edge pixel should be discarded.

(iv) Localization:

Determine the exact edge location.

8 How region will be selected in region splitting and merging algorithm.

Ans:

Step-1:

Spilt into four disjoint ~~quad~~ quadrants of any region R_i for which $P(R_i) = \text{False}$.

Step-2

Merge the adjacent region R_i, R_j for which $P(R_i \cup R_j) = \text{True}$

Step-3

stop when no further merging or splitting is possible.

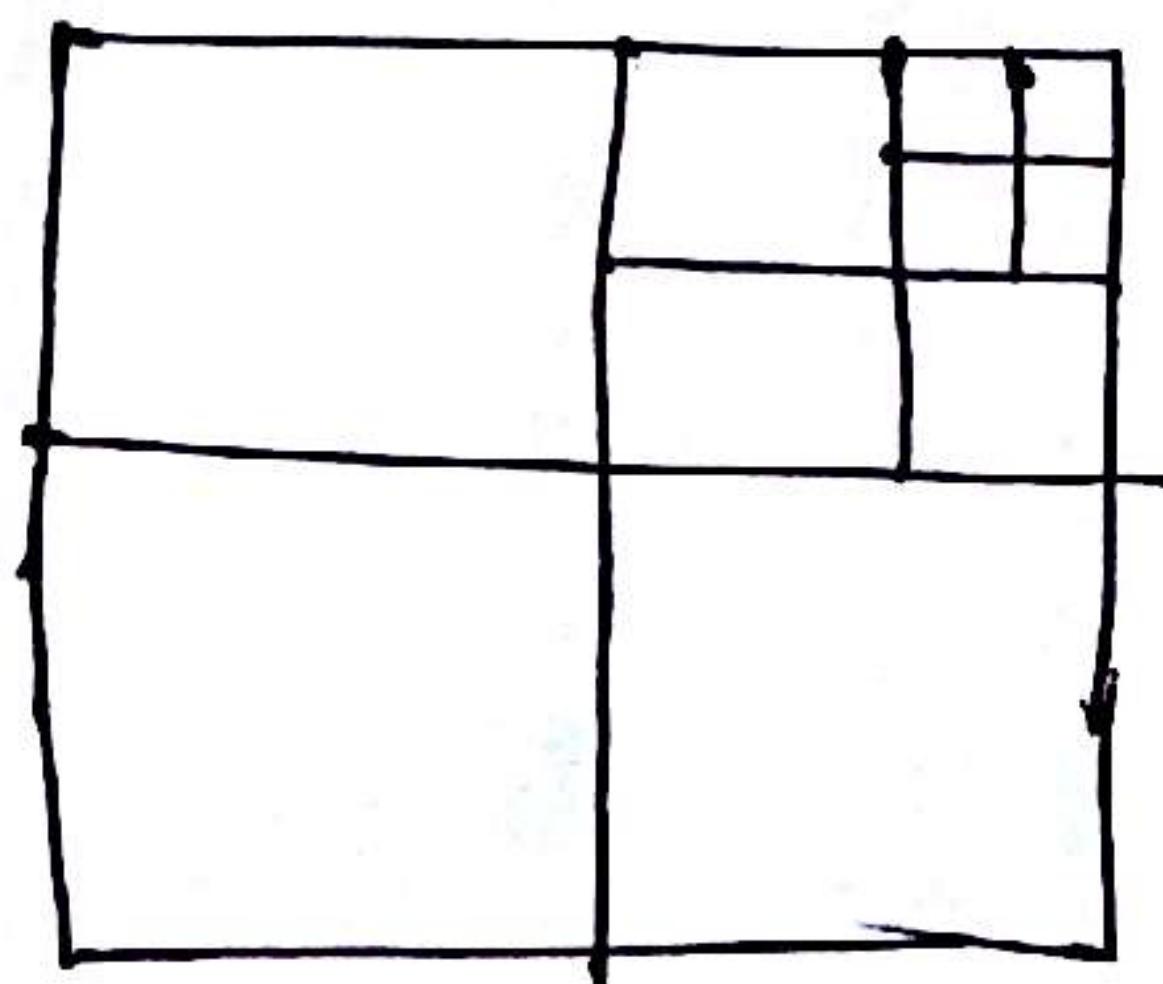


Fig: Region splitting