

6. Define chain codes.

Chain codes are used to represent a boundary by a connected sequence of straight line segment of specified length and direction. Typically this representation is based on 4 or 8 connectivity of the segments. The direction of each segment is coded by using a numbering scheme.

7. What are the demerits of chain code?

The resulting chain code tends to be quite long. Any small disturbance along the boundary due to noise cause changes in the code that may not be related to the shape of the boundary.

8. Specify the various image representation approaches.

- Chain codes
- Polygonal approximation
- Boundary segments

9. What is polygonal approximation method?

Polygonal approximation is an image representation approach in which a digital boundary can be approximated with arbitrary accuracy by a polygon. For a closed curve the approximation is exact when the number of segments in polygon is equal to the number of points in the boundary so that each pair of adjacent points defines a segment in the polygon.

10. Specify the various polygonal approximation methods.

- Minimum perimeter polygons
- Merging techniques
- Splitting techniques

11. Name few boundary descriptors.

- Simple descriptors
- Shape numbers
- Fourier descriptors

12. Give the formula for diameter of boundary.

The diameter of a boundary B is defined as $\text{Diam}(B) = \max_{ij} [D(P_i, P_j)]$, D is the distance measure and P_i, P_j are the points on the boundary.

13. Define length of a boundary.

The length of a boundary is the number of pixels along a boundary. Eg. for a chain coded curve with unit spacing in both directions the number of vertical and horizontal components plus 2 times the number of diagonal components gives its exact length.

14. Define eccentricity and curvature of boundary.

Eccentricity of boundary is the ratio of the major axis to minor axis. Curvature is the rate of change of slope.

15. Define shape numbers.

Shape number is defined as the first difference of smallest magnitude. The order n of a shape number is the number of digits in its representation.

16. Specify the types of regional descriptors.

- Simple descriptors
- Texture

17. Name few measures used as simple descriptors in region descriptors.

- Area

- Perimeter
- Compactness
- Mean and median of gray levels
- Minimum and maximum of gray levels
- Number of pixels with values above and below mean.

18. Define compactness.

Compactness of a region is defined as $(\text{perimeter})^2/\text{Area}$. It is a dimensionless quantity and is insensitive to uniform scale changes.

19. Describe statistical approach.

Statistical approaches describe smooth, coarse, grainy characteristics of texture. This is the simplest one compared to others. It describes texture using statistical moments of the gray-level histogram of an image or region.

20. Define gray-level co-occurrence matrix.

A matrix C is formed by dividing every element of A by n . A is a $k \times k$ matrix and n is the total number of point pairs in the image satisfying P (position operator). The matrix C is called gray-level co-occurrence matrix if C depends on P , the presence of given texture patterns may be detected by choosing an appropriate position operator.

21. Explain structural and spectral approach.

Structural approach deals with the arrangement of image primitives such as description of texture based on regularly spaced parallel lines. Spectral approaches are based on properties of the Fourier spectrum and are primarily to detect global periodicity in an image by identifying high energy, narrow peaks in spectrum.

22. What are the features of Fourier Spectrum?

- Prominent peaks in spectrum gives the principal direction of texture patterns.
- The location of peaks in frequency plane gives fundamental spatial period of patterns.
- Eliminating any periodic components by our filtering leave non- periodic image elements.

23. Define training pattern and training set.

The patterns used to estimate the parameters are called training patterns and a set of such patterns from each class is called a training set.

24. Define training.

The process by which a training set is used to obtain decision functions is called learning or training.

PART – B

1. Write short on the following image representation techniques [Nov/Dec 2017]
 - i) Chain code
 - ii) Polygonal approximation.
2. Mention different techniques for the representation of shapes in a digital image. Explain the principle behind "Fourier Descriptor" based shape representation. [Nov/Dec 2017]
3. Explain in detail about the object recognition techniques based on matching. [Apr/May 2017, Nov/Dec 2016]
4. Explain the various boundary descriptors in detail with a neat diagram. [Apr/May 2017]
5. Explain in detail any two boundary representation schemes and illustrate with examples. [Nov/Dec 2016]