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Subject : Foundation of Signal Processing Class : TE AIML

Assignment-4 Topic : Image Segmentation and Morphology Date : 18-11-2023

(Point, Line & Edge Detection)

Q(1) Apply Horizontal and Vertical line detection mask on the following image. Use appropriate threshold value. Assume virtual Rows and Columns by repeating border pixel values.

$$F = \begin{bmatrix} 6 & 5 & 10 \\ 100 & 100 & 100 \\ 4 & 20 & 10 \end{bmatrix}$$

Q(2) Calculate the direction of edge at the center location of the image.

$$F = \begin{bmatrix} 50 & 60 & 70 \\ 5 & 50 & 80 \\ 7 & 9 & 50 \end{bmatrix}$$

Q(3) Assume that the edge in the gray level image starts in the first row and ends in the last row. Find the cost of all possible edges using the following cost function. Find the edge corresponding to minimum cost path:

5	6	1
6	7	0
7	1	3

Cost(p,q)= Imax - | f(p) – f(q) | where Imax is the maximum intensity in the image and f(p) and f(q) are pixel values at point **p** and **q** respectively. Plot the Graph.

Q(4) For the image given below perform segmentation using Region Growing by Pixel Aggregation. Choose appropriate threshold and seed points.

$$F = \begin{bmatrix} 7 & 5 & 6 & 4 & 5 \\ 7 & 4 & 5 & 7 & 4 \\ 5 & 5 & 6 & 2 & 3 \\ 0 & 3 & 1 & 0 & 4 \\ 2 & 1 & 0 & 2 & 3 \end{bmatrix}$$

Q(5) Segment the following given image such that the difference between maximum intensity value and minimum intensity value in the segmented region is less than 18 using Split and Merge technique.

$$R = \begin{bmatrix} 10 & 9 & 30 & 4 \\ 7 & 6 & 33 & 37 \\ 51 & 52 & 54 & 53 \\ 55 & 57 & 56 & 58 \end{bmatrix}$$

Q(6) Determine following statements are TRUE or FALSE.

(a) Laplacian is not a good edge operator.

(b) Laplacian is better than gradient for detection of edges.

(c) Image resulting from poor illumination can-not be segmented easily.

(d) Segmentation algorithms for monochrome images generally based on two basic properties of gray level values.

(e) First order Derivative operators can detect any edge in the gray image.

(f) Hough transform is not suitable for vertical lines.
