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Question Paper Code:ACDC08



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal-500043, Hyderabad

B.Tech V SEMESTER END EXAMINATIONS (REGULAR) - DECEMBER 2022

Regulation:UG20

IMAGE PROCESSING AND ANALYSIS

Time: 3 Hours

CSE (DATA SCIENCE)

Max Marks: 70

Answer ALL questions in Module I and II

Answer ONE out of two questions in Modules III, IV and V

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

MODULE – I

1. (a) Describe the process of acquiring an image and represent in digital format with relevant diagrams.

[BL: Understand| CO: 1|Marks: 7]

- (b) Find Hadamard forward and reverse transformation of given matrix

$$\begin{bmatrix} 250 & 128 & 100 & 25 \\ 40 & 102 & 95 & 48 \\ 75 & 64 & 120 & 97 \\ 10 & 255 & 0 & 55 \end{bmatrix}$$

[BL: Apply| CO: 1|Marks: 7]

MODULE – II

2. (a) What effect would setting to zero the half of lower-order bit planes have on the histogram of an image in general

[BL: Understand| CO: 2|Marks: 7]

- (b) Four bits/pixel original image is given by

$$\begin{bmatrix} 10 & 12 & 8 & 9 \\ 10 & 12 & 12 & 14 \\ 12 & 13 & 10 & 9 \\ 14 & 12 & 10 & 12 \end{bmatrix}$$

i) Apply histogram equalization to the image by rounding the resulting image pixels to integers.

ii) Sketch the histograms of the original image and the histogram equalized image

[BL: Apply| CO: 2|Marks: 7]

MODULE – III

3. (a) Outline image morphology. Explain the Gray-level operations that can be performed for an image.

[BL: Understand| CO: 3|Marks: 7]

- (b) Determine the value of center pixel after median filtering with window size 3×3

$$\begin{bmatrix} 124 & 126 & 127 \\ 120 & 150 & 125 \\ 115 & 119 & 123 \end{bmatrix}$$

[BL: Apply| CO: 3|Marks: 7]

4. (a) Give the importance of thresholding and explain the steps involved in region based segmentation
[BL: Understand| CO: 4|Marks: 7]

- (b) Analyze the effect of spatial filter for the given image and interpret the results

$$\begin{bmatrix} 10 & 20 & 30 \\ 10 & 25 & 50 \\ 10 & 15 & 50 \end{bmatrix}$$

[BL: Apply| CO: 4|Marks: 7]

MODULE – IV

5. (a) Describe in detail about active contour based segmentation with a suitable examples. Mention its applications.
[BL: Understand| CO: 5|Marks: 7]
- (b) List some medical data sets that can be implemented for medical imaging segmentation and explain the procedure of segmentation method
[BL: Understand| CO: 5|Marks: 7]
6. (a) Identify the various techniques that can be used for edge linking. Discuss the method of feature extraction in image processing.
[BL: Understand| CO: 5|Marks: 7]
- (b) Discuss the importance of SIFT. Show that a invariant feature transformation is separable while the whole-image features object is need to be seperable.
[BL: Apply| CO: 5|Marks: 7]

MODULE – V

7. (a) How an image is pixel based JPEG in image segmentation? Explain 3D display methods in image visualization process.
[BL: Understand| CO: 6|Marks: 7]
- (b) Demonstrate feature based registration with example. State the importance of virtual reality based interactive visualization in image processing.
[BL: Understand| CO: 6|Marks: 7]
8. (a) Explain about elastic deformation base registration method. Why elastic deformation-based registration is better than a interactive principal axis registration?
[BL: Understand| CO: 6|Marks: 7]
- (b) Develop how rigid body visualization can be performed in computer graphics. Construct the rigid body visualization.
[BL: Apply| CO: 6|Marks: 7]

