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Question Paper Code : 10081

M.E./M.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Elective

Applied Electronics

AP 4011 – ADVANCED DIGITAL IMAGE PROCESSING

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Mach Band effect.
2. Compare Opening and Closing in morphological operations.
3. Give the significance of Sobel operator when compared to Prewitt operator.
4. What are the texture properties of an image?
5. Define phase congruency.
6. How hough transform is used for linking edges of an image?
7. Define template matching.
8. What are the steps to follow in image registration?
9. List the measurements on 3D images.
10. What is meant by stereo viewing?

PART B — (5 × 13 = 65 marks)

11. (a) Compute 2D-DCT for the following 3 × 3 matrix.

$$\begin{bmatrix} 7 & 5 & 1 \\ 0 & 6 & 8 \\ 9 & 1 & 4 \end{bmatrix}$$

Discuss about the different frequency components available in the spectrum. Also write the significance of its energy compaction capability towards JPEG compression technique.

Or

- (b) Comment on the contrast of the below given 8 bit-image of size 7 × 7.

70 75 72 73 70 73 74

70 75 72 73 70 73 74

80 85 85 85 85 80 83

80 75 73 80 75 73 72

74 80 85 73 70 73 74

80 85 85 85 85 80 83

80 75 73 80 75 73 72

Describe an enhancement technique to improve the contrast of the given image and obtain the enhanced pixel and draw the histogram plot.

12. (a) Explain the following segmentation methods.
- (i) Active contour method (7)
 - (ii) Region growing (6)

Or

- (b) Explain in detail about wavelet based segmentation methods with suitable example.
13. (a) (i) Explain Gabor filter. (7)
- (ii) Explain fractal model based features. (6)

Or

- (b) Discuss on gray-level co-occurrence matrix with an example and detail the various descriptors used for characterizing GLCM with necessary expressions.

14. (a) (i) Discuss in detail about affine transformation function. (7)
(ii) Describe Cubic spine interpolation. (6)

Or

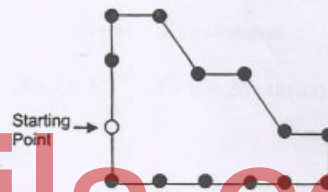
- (b) (i) Describe feature selection and feature correspondence. (7)
(ii) Explain curvelet transform. (6)
15. (a) Discuss about the sources of 3D dataset and slicing the dataset.

Or

- (b) Explain about the volumetric display of 3D image visualization.

PART C — (1 × 15 = 15 marks)

16. (a) (i) Describe the shape number for the following shape and illustrate one real-world application which will utilize chain code and shape number as the shape feature. (8)



- (ii) A section of a horizontal scan line from an image as provided
7 7 6 6 5 5 4 4 2 2 1 1 0 0 3 3 3

Find the first order and second order derivatives. Also mention your inference and highlight about the zero crossing property of second order derivative. (7)

Or

- (b) (i) Apply skeletonization technique to the below given figure and extract its feature. (8)



- (ii) Illustrate with an example, how to apply wavelet transform for multiscale decomposition. (7)