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Question Paper Code : 20241

B.E. / B.TECH. DEGREE EXAMINATIONS, NOVEMBER / DECEMBER 2023

Seventh Semester

B.Tech. – Artificial Intelligence and Data Science

19AD784 – IMAGE ANALYSIS AND COMPUTER VISION

(Regulations: Mepco – R2019)

Duration: 3 Hours

Max. : 100 Marks

Answer ALL Questions

BTL, CO

PART A – (10 × 2 = 20 Marks)

- U, CO1 1. How does picture formation in the eye vary from image formation in a camera? Justify your answer.
- A) Fixed focal length B) Varying distance between lens and imaging plane
C) No difference D) Variable focal length
- R, CO1 2. Give the properties of two-dimensional DFT.
- U, CO2 3. Which of the following in an image can be removed by using a smoothing filter? Justify your answer.
- A) Sharp transitions of brightness levels
B) Sharp transitions of gray levels
C) Smooth transitions of gray levels
D) Smooth transitions of brightness levels
- U, CO2 4. Differentiate Butterworth and Gaussian filters.
- U, CO3 5. Which of the following is the role played by segmentation in image processing? Justify your answer.
- A) Deals with property in which images are subdivided successively into smaller regions
B) Deals with partitioning an image into its constituent parts or objects
C) Deals with extracting attributes that result in some quantitative information of interest
D) Deals with techniques for reducing the storage required saving an image, or the bandwidth required transmitting it
- U, CO3 6. Edge detection is the most common approach for detecting discontinuities. Justify your answer.

- U, CO4 7. The numerical ratio of displacement to distance for a moving object is _____.
Justify your answer.
A) Always less than 1 B) Always equal to 1
C) Always more than 1 D) Equal or less than 1
- U, CO4 8. Differentiate point-based and volumetric representations.
- U, CO5 9. A game based on which animated franchise propelled AR into the mainstream in recent years. Justify your answer.
A) Pokemon B) Super Mario
C) Legend of Zelda D) Sonic the Hedgehog
- R, CO5 10. List the applications that perform Document Image analysis.

PART B – (5 × 16 = 80 Marks)

- R, CO1 11. a) i. Explain in detail about elements of Visual perception. (12 Marks)
- A, CO1 11. a) ii. Using DCT prove the energy compaction property for the given image.

1 1 1 1
1 1 1 1
1 1 1 1
1 1 1 1

(4 Marks)

OR

- R, CO1 11. b) i. Discuss about Image Quantization. Derive and explain the various types of quantization with its properties and remarks. (12 Marks)
- A, CO1 11. b) ii. State and prove the property to obtain the centering of 2D DFT. (4 Marks)

- A, CO2 12. a) Analyze how smoothing and sharpening operations are performed on an image using spatial filters with an example. (16 Marks)

OR

- A, CO2 12. b) A 4×4 , 4 bits/pixel original image is shown below. Apply histogram equalization to the image rounding the resulting image pixels to integers. Sketch the histogram of original image and histogram equalized image.

10 12 8 9
10 12 12 14
12 13 10 9
14 12 10 11

(16 Marks)

U, CO3 13. a) i. Discuss and derive the inverse filter approach restoration and Wiener filter approach restoration. (8 Marks)

U, CO3 13. a) ii. Explain watershed algorithm using dam construction. And mention how to overcome the problem of over segmentation. (8 Marks)

OR

U, CO3 13. b) i. Describe the region growing technique for image segmentation and mention the problem associated with it. (8 Marks)

U, CO3 13. b) ii. Describe how an image is segmented using split and merge technique in association with region and adjacency graph. (8 Marks)

U, CO4 14. a) Distinguish between Spline based motion and Optical flow layered motion. (16 Marks)

OR

U, CO4 14. b) How will you evaluate extracted shape descriptors in 3D vision? Also, explain about photometric stereo. (16 Marks)

U, CO5 15. a) Imaging technology in Medicine made the doctors to see the interior portions of the body for easy diagnosis. Describe in detail the advantages of Digital Processing for Medical applications. (16 Marks)

OR

U, CO5 15. b) Virtual overlays are superimposed on top of the real objects that the user sees. Analyze and describe whether this happens in Virtual reality or Augmented reality. Differentiate Virtual vs Augmented reality. (16 Marks)

