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Question Paper Code: U6E01

B.E./B.Tech. DEGREE EXAMINATION, APRIL / MAY 2025

Sixth Semester

Artificial Intelligence & Data Science

21UAD601- INTELLIGENT COMPUTER VISION

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Find the no of bits required to store a 256*256 image with 32 gray levels CO2- App
2. Let the RGB values of a point is given as (0.2,0.4, 0.6). Find the HSV equivalent of RGB. CO2- App
3. What is global, Local and dynamic or adaptive threshold? CO1- U
4. Explain Region Splitting and merging CO1- U
5. What is string matching in object recognition? CO1- U
6. Define optimum statistical classifiers. CO1- U
7. What are the main applications of 3D object reconstruction? CO1- U
8. Define photogrammetry CO1- U
9. What is the significance of anomaly detection in video surveillance? CO1- U
10. What is the importance of sensor fusion in autonomous vehicles? CO1- U

PART – B (5 x 16= 80 Marks)

11. (a) Let the image A be $\begin{bmatrix} 11 & 18 & 13 & 12 \\ 2 & 2 & 22 & 22 \\ 2 & 22 & 22 & 2 \\ 1 & 68 & 70 & 6 \end{bmatrix}$. Image B be $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$, find the erosion and dilation process. CO2- App (16)

Or

- (b) Let the image $f(x,y) \begin{bmatrix} 1 & 3 & 5 \\ 4 & 4 & 3 \\ 5 & 2 & 2 \end{bmatrix}$ be and the reconstructed image be $f(x, y) = \begin{bmatrix} 1 & 2 & 4 \\ 4 & 4 & 2 \\ 5 & 2 & 1 \end{bmatrix}$ What is MSE, SNR and PSNR for an 8-bit image?
What would you do if the reference image is not given? CO2- App (16)
12. (a) Explain texture Analysis techniques of Gabor Filters, Haralick Features, Local Binary Patterns and its applications. CO1- U (16)
Or
(b) Explain motion in Segmentation techniques of Lucas-Kanade Method, Horn-Schunck Method and compare their effectiveness. CO1- U (16)
13. (a) Given two strings A="GATTACA" and B="GCATGCU", use the Needleman-Wunsch algorithm to compute the alignment score with a match score of +1, a mismatch penalty of -1, and a gap penalty of -2. CO2- App (16)
Or
(b) Apply neural networks to solve an object recognition problem for train a CNN for recognizing objects like cars or animals, with input layers, hidden layers, and output classes. CO2- App (16)
14. (a) Explain feature matching in the context of structure from motion. CO1- U (16)
Or
(b) Explain camera pose estimation and its significance in structure from motion CO1- U (16)
15. (a) Demonstrate the concept of template matching in object recognition with an example. CO3- Ana (16)
Or
(b) Highlight the difference between exhaustive search and efficient search strategies in template matching and show how do efficient search algorithms such as pyramid matching or image pyramids improve computational efficiency? CO3- Ana (16)