Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 20412

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

Fifth Semester

Computer Science and Design

CCS 349 – IMAGE AND VIDEO ANALYTICS

(Common to : Computer Science and Engineering / Computer Science and Engineering (Artificial Intelligence and Machine Learning) / Computer and Communication Engineering / Artificial Intelligence and Data Science / Computer Science and Business Systems and Information Technology)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the difference between image analysis (or computer vision) and computer graphics?

2. List the data structures used for image analysis.

3. What do you understand by the term 'aliasing' ?

4. List out the image analysis tasks.

5. What are the main Goals of image pre-processing?

6. What is the main difference between brightness correction and gray-scale transformation?

7. What are the applications of face recognition?

8. What are the salient features of YOLO.

9. What is video analytics?

10. What is Vanishing Gradient?

PART B — (5 × 13 = 65 marks)

11. (a) Give examples of situations in which brightness transformations, geometric transformations, smoothing, edge detection, and/or image restorations are typically applied. Consider brightness interpolation– explain why it is better to perform using brightness values of neighboring points in the input image other than interpolating in the output image.

Or

(b) List the traditional, hierarchical image data structures and image digitization properties. Explain about the possible levels of image representation and image analysis tasks suitable for image analysis problems.

12. (a) Explain the following with suitable illustrations: (i) Canny edge detection algorithm (ii) parametric edge models.

Or

(b) Write about image smoothing process. Apply histogram equalization to an already equalized image; compare and explain the results of 1-step and 2-step histogram equalization.

13. (a) Describe the differences between motion detection and moving-object detection. Also explain the deep learning R-CNN architecture with relevant sketches.

Or

(b) Define loss function. List the use cases of object detection. Explain the YOLO architecture with neat diagrams and examples.

14. (a) Describe the process of face recognition and explain how the DeepFace solution is obtained by Facebook with illustrative example

Or

(b) Write about the Gesture recognition process. Discuss on FaceNet for face recognition and implementation using FaceNet with case study example.

15. (a) Explain in detail about the RestNet architecture and GoogleNet architecture with suitable illustrations.

Or

(b) Define the terms: video processing, local pre processing. Explain the different use cases of video analytics and the improvements in Inception V2 and V3.

PART C — (1 × 15 = 15 marks)

16. (a) Explain the principles of image restoration based on (i) Inverse convolution (ii) Inverse filtration (iii) Wiener filtration. List the main differences among the above methods. Explain the principles of noise suppression, histogram modification, and contrast enhancement performed in adaptive neighborhoods.

Or

(b) Explain the importance of hysteresis thresholding and non-maximal suppression in the Canny edge detection process, How do these two concepts influence the resulting edge image? Design a simple 5 × 5 detector (convolution mask) that is responsive to thin (1–3 pixel wide) straight lines. How do you detect lines of all directions with such an operator?

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