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Question Paper Code	13103
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**B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024**

Fifth Semester

**Computer Science and Engineering (AIML)**

**20AMPC501 - COMPUTER VISION AND IMAGE PROCESSING**

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

**PART - A (MCQ) (20 × 1 = 20 Marks)**

Answer ALL Questions

	<i>Marks</i>	<i>K- Level</i>	<i>CO</i>
1. How many unique coordinates are required to specify the value of a matrix element in an RGB image? (a) 2                      (b) 3                      (c) 1                      (d) 4	1	K1	CO1
2. The difference in intensity between the highest and the lowest intensity levels in an image is _____ (a) Noise                      (b) Saturation                      (c) Contrast                      (d) Brightness	1	K1	CO1
3. Identify the purpose of pre-processing is used for in computer vision. (a) Store image as array of pixel (b) Remove noise from the image (c) Convert the analog information of light into digital form (d) Obtain a distinction between object and background	1	K3	CO1
4. Which feature detection algorithm uses an integral image and a Hessian matrix-based detector to find keypoints and compute descriptors? (a) SIFT                      (b) ORB                      (c) SURF                      (d) Harris Corner Detector	1	K1	CO2
5. What is the main function of the Laplacian of Gaussian (LoG) edge detection technique? (a) Computing the intensity gradient (b) Applying non-maximum suppression (c) Detecting zero-crossings in the image intensity gradient (d) Connecting weak edges to strong edges	1	K1	CO2
6. Which of the following statements is/are false? (a) In canny edge detection, non-maximum suppression is done along the direction of gradient but not along the direction of edge. (b) DoG can be seen as a single non-separable 2D convolution or the difference of two separable convolutions. (c) The canny edge detector is a linear filter because it uses the Gaussian filter to blur the image and then use linear to compute the gradient. (d) DoG can be considered an approximation to the LoG.	1	K1	CO2
7. What is the main aim of Region Splitting and Merging technique? (a) To increase image complexity                      (b) To simplify image representation (c) To reduce computational complexity                      (d) To randomly partition regions	1	K1	CO3
8. Which technique is most effective for enhancing the detection of anatomical structures in medical imaging? (a) Region-Based Thresholding                      (b) Adaptive Thresholding (c) Edge Detection                      (d) Hybrid Approaches	1	K1	CO3
9. What is an application of image segmentation in industrial inspection? (a) Surveillance monitoring                      (b) Defect identification (c) Pest detection                      (d) Crop health analysis	1	K1	CO3

10. How does image segmentation differ from object detection? 1 K1 CO4  
 (a) Image segmentation focuses on detecting objects within an image.  
 (b) Object detection segments an image into regions based on object boundaries.  
 (c) Image segmentation divides an image into regions with similar characteristics.  
 (d) Object detection assigns a label to each pixel in an image.
11. Which of the following techniques is responsible for classifying each pixel in an image with specific object classes in object recognition? 1 K1 CO4  
 (a) Image Classification (b) Object Detection  
 (c) Semantic Segmentation (d) Instance Segmentation
12. Which machine learning models are widely used for 3D object classification in computer vision tasks? 1 K1 CO4  
 (a) Generative adversarial networks (GANs) (b) Reinforcement learning  
 (c) Convolutional neural networks (CNNs) (d) Transfer learning
13. What does Roboflow provide to ensure data privacy and security? 1 K1 CO5  
 (a) Robust Measures  
 (b) Extensive Repository of Pre-trained Models  
 (c) Collaborations with Academic Institutions  
 (d) Comprehensive Annotation Tools
14. Which platform focuses on manufacturing and inspection processes? 1 K1 CO5  
 (a) PyTorch (b) TensorFlow (c) Roboflow (d) Landing AI
15. What does the Real-time Monitoring feature in Landing AI enable for users? 1 K1 CO5  
 (a) Quality Control (b) Custom Model Training  
 (c) Tracking of Processes (d) Evaluation of Model Performance
16. What feature of Roboflow allows users to evaluate model performance with precision? 1 K1 CO5  
 (a) Integration with Jupyter Notebooks (b) Collaboration with Google Cloud  
 (c) Annotation Tools (d) Performance Monitoring
17. How Computers interpret digital images represented as 2D or 3D matrices. 1 K1 CO6  
 (a) Through amplitude and coordinates (b) Through color representation  
 (c) Through texture analysis (d) Through intensity and location
18. What is the purpose of using patches around tracked points in optical flow analysis? 1 K1 CO6  
 (a) To enhance image contrast (b) To detect edges  
 (c) To compute feature vectors (d) To accurately determine displacement
19. \_\_\_\_\_ calculates optical flow locally by assuming constant flow in small regions for motion analysis. 1 K1 CO6  
 (a) Kalman Filter (b) Mean-Shift Tracking (c) Optical Flow (d) Lucas-Kanade Method
20. What is the primary role of dynamics in motion analysis? 1 K1 CO6  
 (a) Focusing on motion patterns and their characteristics.  
 (b) Considering forces and their effects on moving objects.  
 (c) Analyzing the speed and acceleration of objects.  
 (d) Evaluating the color and shape of moving objects.

**PART - B (10 × 2 = 20 Marks)**

Answer ALL Questions

21. What is Computer vision? 2 K1 CO1
22. Define histogram with an example. 2 K1 CO1
23. What are the examples of feature detection techniques used in computer vision for extracting key points and descriptors from images? 2 K2 CO2
24. List the advantages of SIFT. 2 K1 CO2
25. Define pixel based segmentation. 2 K1 CO3
26. Define region merging. 2 K1 CO3
27. List the applications of object detection. 2 K1 CO4
28. Write the technique to find different boundaries of the different textures in the image. 2 K1 CO4

29. What is one of the popular image processing libraries? 2 K1 CO5
30. List the challenges of 3D computer vision. 2 K1 CO6

**PART - C (6 × 10 = 60 Marks)**

Answer ALL Questions

31. a) Summarize the Computer Imaging systems and its components in detail. 10 K2 CO1
- OR**
- b) List the various approaches used in Image enhancement and then discuss any one method of it. 10 K2 CO1
32. a) Explain the pre-processing steps which are essential for object recognition systems alongside feature extraction with CNNs. 10 K2 CO2
- OR**
- b) Discuss about scale and transformation invariant feature detection. 10 K2 CO2
33. a) Apply any edge detection technique to segment an object. 10 K3 CO3
- OR**
- b) Utilize K- means clustering method to segment an object and explain with a neat flowchart. 10 K3 CO3
34. a) Build an algorithm for image segmentation using a deep learning model. 10 K3 CO4
- OR**
- b) Build an algorithm for image segmentation using a suitable object detection technique. 10 K3 CO4
35. a) Compare the performances of OpenCV and Pillow. 10 K2 CO5
- OR**
- b) Compare the performances of Tensorflow and Pytorch. 10 K2 CO5
36. a) Discuss the object classification methods in detail 10 K2 CO6
- OR**
- b) List the applications of computer vision in autonomous vehicle navigation. Explain an algorithm for an application with neat block diagram. 10 K2 CO6