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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech Integrated

SEM: VIII - THEORY EXAMINATION (2025 - 2026)

Subject: Computer Vision

Time: 3 Hours

Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.
2. Maximum marks for each question are indicated on right -hand side of each question.
3. Illustrate your answers with neat sketches wherever necessary.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.
6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A

20

1. Attempt all parts:-

- (1.1) The primary goal of image segmentation in computer vision is _____ 1
 (CO1K1)
- (a) Recognizing objects in an image
 - (b) Dividing an image into regions with similar properties
 - (c) Compressing image data
 - (d) Enhancing image resolution
- (1.2) Deep learning is useful as _____ (CO1 K1) 1
- (a) Non linear function can be represented in a better way
 - (b) linear function can be represented in better way
 - (c) polynomial function can be represented in better way
 - (d) None of the above..
- (1.3) Which technique is commonly used to minimize false positives in moving object detection.(CO2K1) 1
- (a) Background modeling
 - (b) Adaptive learning
 - (c) Data association
 - (d) Model pruning
- (1.4) In GoogLeNet, what is the primary building block used to create an "inception" module.(CO2K1) 1
- (a) Max-pooling layer
 - (b) Fully connected layer
 - (c) Convolutional layer with multiple filter sizes

- (d) Recurrent layer
- (1.5) Geometric operations in image processing typically involve transformations such as:(CO3K1) 1
- (a) Scaling, rotation, and translation
 - (b) Histogram equalization
 - (c) Median filtering
 - (d) Edge detection
- (1.6) In the context of object detection, what does YOLO stand for (CO3K1) 1
- (a) You Only Look Once
 - (b) Your Own Labeling Operation
 - (c) Yearning for Object Localization
 - (d) Youthful Object Locator Optimizer
- (1.7) State the primary purpose of the sliding windows technique in object detection(CO4,K2) 1
- (a) To detect objects of varying sizes and positions within an image.
 - (b) To compress images for faster processing.
 - (c) To enhance the color contrast in images.
 - (d) To remove noise from images.
- (1.8) State the purpose of the ROI Pooling Layer in Fast R-CNN.(CO4,K2). 1
- (a) Generating region proposals
 - (b) Extracting convolutional features
 - (c) RoI Pooling
 - (d) Softmax classification
- (1.9) Points whose locations are known exactly in the input and reference images are used in Geometric Spacial Transformation.(CO5K2). 1
- (a) Known points
 - (b) Key-points
 - (c) Réseau points
 - (d) Tie points
- (1.10) The filter order of a Butterworth lowpass filter determines whether it is a very sharp or extremely smooth filter function, or an intermediate filter function. Which of the following filters does the filter approach if the parameter value is very high(CO5,K2) 1
- (a) Gaussian lowpass filter
 - (b) Ideal lowpass filter
 - (c) Gaussian & Ideal lowpass filters
 - (d) None of the mentioned

2. Attempt all parts:-

- (2.1) List successful interdisciplinary collaborations where computer vision integrates with other technologies.(CO1K2). 2
- (2.2) Evaluate the size of a feature map, given that the image size is 32x32, filter size is 2

- 5x5, stride is 1, and no padding.(CO2K2)
- (2.3) Name a common technique for object detection and image segmentation using CNNs.(CO3K2) 2
- (2.4) Explain a common application of digital watermarking beyond copyright protection.(CO4K2) 2
- (2.5) Explain the concept of conditional GANs (cGANs). (CO5K2) 2

SECTION-B

30

Answer any one of the following:-

- (3.1) Apply the concept of convolutional neural networks (CNNs) and their role in computer vision tasks(CO1,K3) 6
- (3.2) Propose innovative applications of mixed reality technology in industries such as architecture, engineering, and construction (AEC), including virtual prototyping, remote collaboration, and on-site visualization.(CO1K3) 6

Answer any one of the following:-

- (3.3) State the purpose of using multiple filters of varying sizes in the inception network.(CO2K3) 6
- (3.4) Execute the arrangement of inception blocks in advanced convolutional neural networks.(CO2,K3) 6

Answer any one of the following:-

- (3.5) Explain the concept of Quality Analysis in image processing and its relevance in various industries.(CO3K3) 6
- (3.6) Discuss the challenges and potential biases associated with object detection in real-world applications, particularly when dealing with diverse datasets.(CO3K3) 6

Answer any one of the following:-

- (3.7) Mention the primary innovation of Faster R-CNN and its performance with example.(CO4K4) 6
- (3.8) Explain the concept of sliding windows in object detection with example.(CO4K3) 6

Answer any one of the following:-

- (3.9) VAEs and GANs, and what are their key differences with example.(CO5K3) 6
- (3.10) Mark down fundamental differences between generative models and discriminative models in machine learning.(CO5K3) 6

SECTION-C

50

4. Answer any one of the following:-

- (4.1) We always use ODD kernels like 3 x 3, 5 x 5 & so on why not 4 x 4 kernels(even kernels). Explain the statement why it is important with example.(CO1K4) 10
- (4.2) Explain the process of performing face detection using OpenCV and differentiate between face detection and face recognition.(CO1K3) 10

5. Answer any one of the following:-

- (5.1) In what domains or applications has LeNet-5 demonstrated success, and why is it well-suited for these tasks. (CO2K4). 10
- (5.2) Determine the most effective neural network architecture for image classification.(CO2K4) 10

6. Answer any one of the following:-

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|-------|--|----|
| (6.1) | Explain the Fully Convolutional Network (FCN) architecture in detail. How does it differ from traditional convolutional neural networks with example.(CO3K4) | 10 |
| (6.2) | Explain the concept of active contours and their applications in image processing for efficient result.(CO3K4) | 10 |

7. Answer any one of the following:-

- | | | |
|-------|--|----|
| (7.1) | Mention the challenges of scaling object detection to handle a large number of object classes.(CO4K4) | 10 |
| (7.2) | Explain neural network distinguish between useful and non useful features in computer vision with its performance analysis and example.(CO4K4) | 10 |

8. Answer any one of the following:-

- | | | |
|-------|--|----|
| (8.1) | Explain the basic working principle of a Variational Autoencoder (VAE) in the context of generative modeling.(CO5K4) | 10 |
| (8.2) | Explain the concept of semi-supervised learning and how GANs can be adapted for semi-supervised tasks.(CO5K4) | 10 |

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