Printed Page:- 04 **Subject Code:- AMICSE0801**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech. (Integrated)

SEM: VIII - THEORY EXAMINATION (2023 - 2024)

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-a. The primary goal of image segmentation in computer vision is _____ (CO1) 1

(a) Recognizing objects in an image

(b) Dividing an image into regions with similar properties

(c) Compressing image data

(d) Enhancing image resolution

1-b. The component of learning system is(CO1) 1

(a) Model

(b) Learning rules

(c) Goal

(d) All of the above

1-c. In transfer learning, what is the purpose of the "fine-tuning" process(CO2). 1

(a) Rewriting the entire model architecture

(b) Adapting the pre-trained model to a new task

(c) Eliminating all previous knowledge from the model

(d) Reducing the number of parameters in the model

1-d. _____ is Limitation of deep learning(CO2) 1

(a) Obtain huge training datasets

(b) Data labeling

(c) None of the above

(d) All of above

1-e. Mention one of the following is a common method for upscaling feature maps in convolutional neural networks (CNNs).(CO3) 1

(a) Max-pooling

(b) Average-pooling

(c) Transpose convolution (Deconvolution)

(d) Batch normalization

1-f. State the purpose of pixel transformations in image processing.(CO3) 1

(a) To change the aspect ratio of an image

(b) To resize the image

(c) To enhance or modify pixel values

(d) To add noise to the image

1-g. State the following techniques can be used to reduce the number of channels/feature maps(CO4) 1

(a) Pooling

(b) Padding

(c) 1×1 convolution

(d) Batch Normalization

1-h. Mention machine learning algorithm is commonly used for object detection in deep learning models(CO4). 1

(a) Linear Regression

(b) Decision Trees

(c) Convolutional Neural Networks (CNN)

(d) k-Nearest Neighbors (k-NN)

1-i. The effect caused by the use of an insufficient number of intensity levels in smooth areas of a digital image(CO5) _____ 1

(a) False Contouring

(b) Interpolation

(c) Gaussian smooth

(d) Contouring

1-j. Points whose locations are known exactly in the input and reference images are used in Geometric Spacial Transformation(CO5). 1

(a) Known points

(b) Key-points

(c) Réseau points

(d) Tie points

2. Attempt all parts:-

2.a. Explain the concept of feature extraction in CNNs(CO1) 2

2.b. Explain flattening layer in CNN architecture(CO2). 2

2.c. Give an example of a geometric operation in image processing.(CO3) 2

2.d. Illustrate is the sliding windows technique in object detection(CO4) 2

2.e. Illustrate concept of Deep Generative Model (DGM)(CO5) 2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a. Explain the role of computer vision in enabling autonomous vehicles to perceive and navigate their surroundings safely(CO1). 6

3-b. Discuss computer vision algorithms being applied in healthcare(CO1). 6

3-c. Elaborate feed forward in Convolution Neural Network.(CO2) 6

3-d. Describe computational graph in Deep Learning.(CO2) 6

3.e. Explain the Fully Convolutional Network (FCN) architecture and its significance in semantic segmentation.(CO3) 6

3.f. Explain Fast R-CNN differ from the original R-CNN (CO4) 6

3.g. Challenges and considerations VAEs and GANs(CO5) 6

SECTION C **50**

4. Answer any <u>one</u> of the following:-

4-a. Mention some advantages of deep learning over traditional machine learning algorithms for image recognition and other tasks that require understanding of image (CO1). 10

4-b. Explain filtering, stride and padding in Convolutional Neural Network.(CO1) 10

5. Answer any <u>one</u> of the following:-

5-a.	In what domains or applications has LeNet-5 demonstrated success, and why is it well-suited for these tasks(CO2).	10
5-b.	Explain the different types of Pooling in CNN with diagram (CO2).	10

6. Answer any <u>one</u> of the following:-

6-a.	Describe the concept of Region-based Convolutional Neural Networks (R-CNNs) and their role in object detection.(CO3)	10
6-b.	Describe the role of edge detection in image processing and its applications in image segmentation and feature extraction(CO3).	10

7. Answer any <u>one</u> of the following:-

7-a.	Explain the role of transfer learning in object detection(CO4).	10
7-b.	Illustrate s the YOLO (You Only Look Once) algorithm work in object detection(CO4)	10

8. Answer any <u>one</u> of the following:-

8-a.	Explain the basic working principle of a Variational Autoencoder (VAE) in the context of generative modeling(CO5)	10
8-b.	Describe the architecture and components of a typical GAN, including the generator and discriminator networks(CO5)	10