Assignment 2

Unit 1: Introduction to Deep Learning

1. Define deep learning. How does it differ from traditional machine learning?

2. Explain the architecture and working of an Artificial Neural Network (ANN).

3. What is the role of activation functions in deep learning? Explain with examples.

4. Compare and contrast forward propagation and backpropagation.

5. Discuss various gradient descent optimization techniques like SGD, Mini-batch, and Momentum.

Unit 2: Model Improvement and CNNs

6. What is overfitting and underfitting? How can you prevent them?

7. Explain the concepts of bias-variance tradeoff with examples.

8. Discuss the importance of dropout and early stopping in model improvement.

9. What are different data augmentation techniques used in image preprocessing?

10. Describe the architecture and functionality of a Convolutional Neural Network (CNN).

Unit 3: Object Detection and Image Segmentation

11. How is object detection different from image classification?

12. Describe the steps involved in object detection using CNNs.

13. Explain the working of one-stage and two-stage detector with examples (e.g., RCNN).

14. What are the evaluation metrics used in object detection? Explain each.

15. Differentiate between semantic segmentation and instance segmentation.

Unit 4: Generative and Reinforcement Learning

16. What is a Variational Autoencoder (VAE)? Describe its components.

17. Explain how Generative Adversarial Networks (GANs) work with a neat diagram.

18. Describe key applications of generative learning in AI.

19. What is Deep Reinforcement Learning? Explain exploration vs exploitation.

20. Describe Markov Decision Process Q Learning and its role in reinforcement learning.