

Exam.Code:0924

Sub. Code: 33571

2056

B.E. (Information Technology) Sixth Semester
OEIT-601: Deep Learning

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

1. Attempt the following:-

- (a) What is the McCulloch-Pitts neuron model? How does it simulate biological neurons?
- (b) Distinguish between a Perceptron and a Multilayer Perceptron (MLP).
- (c) What is the vanishing gradient problem? Why is it a challenge in deep networks?
- (d) Define regularization. How does Dropout prevent overfitting?
- (e) What is an LSTM? How does it differ from a simple RNN? (5x2)

UNIT - I

- 2. a) Trace the partial history of Deep Learning. Discuss at least two major Deep Learning success stories that demonstrate its real-world impact.
- b) Explain the Perceptron Learning Algorithm with a suitable example. What are the limitations of a single-layer Perceptron, and how does the MLP overcome them? (2x5)
- 3. a) Explain the architecture of a Feedforward Neural Network. Describe the representation power of FFNNs and the role of activation functions such as Sigmoid and ReLU.
- b) Derive the Backpropagation algorithm for a two-layer network. What is the role of the chain rule in weight updates? (6,4)
- 4. a) Explain Principal Component Analysis (PCA) and its geometric interpretation. How is Singular Value Decomposition (SVD) related to PCA?
- b) What are autoencoders? Describe the relationship between autoencoders and PCA. Briefly explain Sparse and Contractive autoencoders. (6,4)

P.T.O.

(2)

UNIT - II

5. a) Explain the Bias-Variance Tradeoff in the context of deep learning. How do L2 regularization and Early Stopping help in managing this tradeoff?

b) What is Dataset Augmentation? Describe the techniques of Parameter Sharing, Parameter Tying, and Injecting Noise at input as regularization strategies. (2,5)
6. a) Describe the architecture of a Convolutional Neural Network (CNN). Explain the significance of AlexNet and VGGNet in the evolution of deep learning for computer vision.

b) What is Guided Backpropagation? Explain the concepts of Deep Dream and Deep Art with reference to visualizing CNNs. (6,4)
7. a) Explain Backpropagation Through Time (BPTT) for training Recurrent Neural Networks. How does Truncated BPTT address the problem of vanishing and exploding gradients?

b) Describe the Encoder-Decoder model and the Attention Mechanism. How is Attention applied over images in vision tasks? (6,4)

x-x-x