BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(CSE)-AIML-2021
Course Name – Deep Learning
Course Code - PEC-CSM701A
(Semester VII)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Choose which part of the biological neuron receives incoming signals?
a) Axon b) Dendrite
c) Synapse d) Soma

(ii) Tell the point of communication between two neurons is called:
a) Axon b) Synapse
c) Dendrite d) Soma

(iii) Identify which learning algorithm is used to train a linear perceptron?
a) Backpropagation b) Gradient Descent
c) Perceptron Learning Algorithm d) Genetic Algorithm

(iv) Identify what is the advantage of mini-batch gradient descent over stochastic gradient descent?
a) Uses the entire dataset b) Less computational cost
c) Faster convergence d) More stable updates

(v) Select which phase of backpropagation calculates the gradient of the loss function with respect to each weight?
a) Initialization phase b) Forward pass
c) Backward pass d) Weight update

(vi) Collect what is the primary objective of an autoencoder?
a) Classify data b) Predict future values
c) Store large datasets d) Encode data into a different representation

(vii) Identify primary function of deep generative models
a) Classification b) Regression

c) Data generation d) Clustering

(viii) Estimate the correct choice that distinguishes GANs (Generative Adversarial Networks) from other generative models?

a) They use supervised learning. b) They consist of two competing networks.
c) They rely on Markov chains. d) They are only for image generation.

(ix) Interpret the following: In VAEs, the encoder is responsible for:

a) Generating new data samples. b) Learning the distribution of the input data.
c) Performing classification tasks. d) Reducing dimensionality.

(x) Identify the activation function typically used in RBMs

a) ReLU b) Sigmoid
c) Tanh d) Softmax

(xi) Estimate the kind of learning is primarily used to train RBMs

a) Backpropagation b) Contrastive Divergence
c) Q-learning d) Genetic algorithms

(xii) Determine the key benefit of using RBMs for feature learning.

a) They require labeled data. b) They automatically learn a distributed representation of the input.
c) They are faster than supervised models. d) They are easy to interpret.

(xiii) Describe a Deep Belief Network (DBN).

a) A type of convolutional neural network b) A generative model composed of multiple layers of stochastic, latent variables
c) A feedforward neural network d) A type of recurrent neural network

(xiv) In the context of speech recognition, determine what is CTC (Connectionist Temporal Classification) used for?

a) Handling variable-length sequences in speech data b) Improving the quality of the audio signal
c) Identifying different languages in speech d) Eliminating background noise from audio signals

(xv) Identify the correct sequences of layers in CNN.

a) Input layer, convolution and activation, pooling, data flattenning, fully connected layer, output layer b) Input layer, data flattenning, convolution and activation, pooling, fully connected layer, output layer
c) Input layer, data flattenning, convolution and activation, fully connected layer, pooling, output layer d) Input layer, convolution and activation, fully connected layer, data flattenning, pooling, output layer

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Describe the basic structure of a Generative Adversarial Network (GAN) and the role of its two components. (3)
3. Discuss a Multilayer Perceptron (MLP), and how does it differ from a single-layer perceptron? (3)
4. Describe the application of Recursive Neural Networks in natural language processing (NLP). (3)
5. Describe the concept of a "threshold" in biological neurons and its equivalent in artificial neurons. (3)
6. Assess how does the Contrastive Divergence (CD) algorithm work for training RBMs? (3)

OR

Argue about the statement : Restricted Boltzmann Machines (RBMs) considered building blocks for Deep Belief Networks (DBNs). (3)

Group-C
(Long Answer Type Questions) 5 x 6=30

7. Describe the concept of the latent space in deep generative models. including VAEs and GANs. (5)
8. Explain the training process of a Deep Belief Network (DBN) and assess the reasons of using a layer-by-layer pre-training strategy. (5)
9. Compare the backpropagation algorithm with gradient descent in terms of their roles in training neural networks. (5)
10. Summarize the concept of AlexNet. (5)
11. Test the role of thresholding in artificial neurons and how it helps the neuron decide when to fire. (5)
12. Express the cause of vanishing and exploding gradient problem in RNNs, and the role played by them in affecting the performance on long sequences? (5)

OR

Write the applications of Bidirectional RNNs and justify its cause. (5)

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