

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Fifth Semester

Artificial Intelligence and Data Science

(Common to Fourth Semester - Computer Science and Engineering (AIML))

20AIPC502 - DEEP LEARNING

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

- | | <i>Marks</i> | <i>K-
Level</i> | <i>CO</i> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------------|-----------|
| 1. Which component of the biological neuron corresponds to the activation function in an artificial neuron?
(a) Soma (b) Axon (c) Dendrites (d) Synapse | 1 | K1 | CO1 |
| 2. What is a common activation function used in the output layer for binary classification problems?
(a) ReLU (b) Sigmoid (c) Tanh (d) Softmax | 1 | K1 | CO1 |
| 3. What is the purpose of a loss function in a neural network?
(a) Measure the accuracy of the model (b) Update the model's weights
(c) Evaluate the model's predictions (d) Quantify the error of the model | 1 | K1 | CO1 |
| 4. Which technique is commonly used in representation learning?
(a) Principal Component Analysis (PCA) (b) Clustering
(c) Neural Networks (d) Decision Trees | 1 | K1 | CO2 |
| 5. What does the "width" of a neural network refer to?
(a) The number of layers (b) The number of neurons in a layer
(c) The number of input features (d) The size of the output layer | 1 | K1 | CO2 |
| 6. What is unsupervised training in the context of neural networks?
(a) Training with labeled data (b) Training with unlabeled data
(c) Training with partially labeled data (d) Training without using data | 1 | K1 | CO2 |
| 7. What does "striding" control in a CNN?
(a) The number of filters used (b) The depth of the convolutional layer
(c) How much the filter moves over the input image (d) The size of the filter | 1 | K1 | CO3 |
| 8. Why is max pooling often used in CNNs?
(a) To increase the number of parameters (b) To reduce the dimensionality of the input
(c) To amplify the signal (d) To regularize the model | 1 | K1 | CO3 |
| 9. What is an application of CNNs outside image classification?
(a) Natural language processing (b) Time series forecasting
(c) Speech recognition (d) All of the above | 1 | K1 | CO3 |
| 10. What is the key difference between Recurrent Neural Networks (RNNs) and feed forward neural networks?
(a) RNNs have weights, but feed forward networks do not.
(b) RNNs maintain a hidden state across time steps, while feed forward networks do not.
(c) RNNs are used for static data, while feed forward networks are used for sequential data.
(d) Feed forward networks are always deeper than RNNs. | 1 | K1 | CO4 |
| 11. What is the main advantage of a Bidirectional RNN (BRNN)?
(a) It has fewer parameters than a unidirectional RNN.
(b) It can process both the past and the future context of a sequence.
(c) It eliminates the need for a hidden state.
(d) It is faster to train than unidirectional RNNs. | 1 | K1 | CO4 |

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----|-----|
| 12. In the encoder-decoder architecture, which part is responsible for producing the final output sequence?
(a) Encoder (b) Decoder (c) Attention mechanism (d) Input layer | 1 | K1 | CO4 |
| 13. Which type of neural network is specifically designed to handle sequential data?
(a) Convolutional Neural Network (CNN) (b) Recurrent Neural Network (RNN)
(c) Feed-forward Neural Network (d) Generative Adversarial Network (GAN) | 1 | K1 | CO5 |
| 14. What is a key advantage of using GRUs over LSTMs?
(a) Simpler architecture with fewer parameters
(b) Better at learning long-term dependencies
(c) More complex and flexible than LSTMs
(d) Capable of handling larger sequence | 1 | K1 | CO5 |
| 15. What is the major benefit of using sequence-to-sequence models with attention mechanisms?
(a) They reduce the computational complexity of RNNs
(b) They improve the learning of long-range dependencies by focusing on relevant parts of the sequence
(c) They enable the model to predict multiple outputs at once
(d) They increase the accuracy of fully connected layers | 1 | K1 | CO5 |
| 16. What is the main application of a Many-to-One RNN architecture?
(a) Text translation (b) Sentiment analysis (c) Speech recognition (d) Image classification | 1 | K1 | CO5 |
| 17. What type of learning does a DBN employ in its lower layers?
(a) Supervised learning (b) Unsupervised learning
(c) Semi-supervised learning (d) Reinforcement learning | 1 | K1 | CO6 |
| 18. What is the role of the discriminator in a GAN?
(a) To create new images (b) To distinguish between real and fake data
(c) To optimize the generator (d) To classify the data into categories | 1 | K1 | CO6 |
| 19. Deep Associative Memory Networks are particularly useful in which area?
(a) Generative modeling (b) Pattern completion
(c) Video synthesis (d) Supervised learning tasks | 1 | K1 | CO6 |
| 20. Which of the following components are parts of a Generative Adversarial Network?
(a) Generator and Decoder (b) Generator and Discriminator
(c) Encoder and Decoder (d) Classifier and Generator | 1 | K1 | CO6 |

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

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|--------------------------------------------------------------------------------|---|----|-----|
| 21. Define Hyper parameters tuning. | 2 | K1 | CO1 |
| 22. Differentiate between biological and artificial neurons. | 2 | K2 | CO1 |
| 23. Define Over fitting. | 2 | K1 | CO2 |
| 24. How many types of activation function are available? | 2 | K1 | CO2 |
| 25. What are Restricted Boltzmann Machines? | 2 | K1 | CO3 |
| 26. What is stride in the context of CNNs? | 2 | K1 | CO3 |
| 27. What are the limitations of Bidirectional RNN? | 2 | K1 | CO4 |
| 28. Define LSTM. | 2 | K1 | CO4 |
| 29. What is the key purpose of using gradient clipping in training RNNs? | 2 | K1 | CO5 |
| 30. What type of neural network is often used for detecting fake fingerprints? | 2 | K1 | CO6 |

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

31. a) Explain the architecture of a Neural network with neat diagram. 10 K2 CO1
- OR**
- b) What is regularization? How does Regularization help reduce Over fitting? 10 K2 CO1
32. a) Describe the methods of Representation Learning. 10 K2 CO2
- OR**
- b) Describe the various Activation functions RELU, LRELU and ERELU. 10 K2 CO2
33. a) Describe the Alexnet Architecture with necessary diagrams. 10 K2 CO3
- OR**
- b) Write the applications of real-world applications of Convolutional neural network (CNN) 10 K2 CO3
34. a) Explain the architecture of RNN with its variants. 10 K2 CO4
- OR**
- b) Explain the different types of computational graphs. Give examples. 10 K2 CO4
35. a) Explain DBN and DBM with necessary examples. 10 K2 CO5
- OR**
- b) Explain the concepts of Forward and Backward Computational Graphs with example expressions. 10 K2 CO5
36. a) Describe Deep Boltzmann Machine Architecture with necessary diagram. 10 K2 CO6
- OR**
- b) Explain the concept of Deep Fake Technology with example. 10 K2 CO6