Unit-3

1.Backpropagation is primarily used for training:

A) Single-layer networks
B) Multilayer networks
C) Recurrent networks only
D) Competitive networks

Answer: B) Multilayer networks

2. Backpropagation learning is based on:

A) Dynamic Programming
B) Error Correction Learning
C) Reinforcement Learning
D) Competitive Learning

Answer: B) Error Correction Learning

3. The gradient used in backpropagation is calculated using:

A) Integration
B) Differentiation
C) Multiplication
D) Factorization

Answer: B) Differentiation

4. The purpose of backpropagation is to:

A) Maximize network error
B) Minimize network error
C) Increase hidden layers
D) Reduce training samples

Answer: B) Minimize network error

5. Which mathematical concept is essential in backpropagation?

A) Probability Theory
B) Differentiation
C) Matrix Inversion
D) Graph Theory

Answer: B) Differentiation

6.The Hessian Matrix consists of:

A) First-order derivatives
B) Second-order partial derivatives
C) Input vectors
D) Output vectors

Answer: B) Second-order partial derivatives

7. Hessian Matrix provides information about:

A) Classification accuracy
B) Curvature of error surface
C) Number of neurons
D) Training samples

Answer: B) Curvature of error surface

8. Generalization refers to:

A) Memorizing training data
B) Performing well on unseen data
C) Increasing neurons
D) Reducing inputs

Answer: B) Performing well on unseen data

9. A network with poor generalization is said to:

A) Underfit
B) Overfit
C) Normalize
D) Cluster

Answer: B) Overfit

10. Cross-validation is mainly used to:

A) Increase hidden layers
B) Evaluate model performance
C) Remove neurons
D) Generate inputs

Answer: B) Evaluate model performance

11. Which dataset is used to test generalization during training?

A) Training Set
B) Validation Set
C) Weight Set
D) Hidden Set

Answer: B) Validation Set

12. Cross-validation helps prevent:

A) Classification
B) Optimization
C) Overfitting
D) Clustering

Answer: C) Overfitting

13. Network pruning is the process of:

A) Adding neurons
B) Removing unnecessary connections or neurons
C) Increasing learning rate
D) Adding hidden layers

Answer: B) Removing unnecessary connections or neurons

14. The primary goal of network pruning is:

A) Increase complexity
B) Simplify network structure
C) Increase training data
D) Reduce outputs

Answer: B) Simplify network structure

15. Which is a virtue of backpropagation?

A) Can learn complex nonlinear mappings
B) Requires no training data
C) Uses no weights
D) Has no computational cost

Answer: A) Can learn complex nonlinear mappings

16. Which is a limitation of backpropagation?

A) Slow convergence
B) No hidden layers
C) No weight updates
D) No error calculation

Answer: A) Slow convergence

17. Accelerated convergence techniques are used to:

A) Increase error
B) Speed up learning
C) Reduce inputs
D) Increase neurons

Answer: B) Speed up learning

18. Momentum is used in backpropagation to:

A) Slow training
B) Accelerate convergence
C) Remove neurons
D) Generate outputs

Answer: B) Accelerate convergence

19. Supervised learning requires:

A) No target outputs
B) Desired outputs
C) Random outputs
D) Hidden outputs

Answer: B) Desired outputs

20. In supervised learning, training examples contain:

A) Inputs only
B) Outputs only
C) Input-output pairs
D) Weights only

Answer: C) Input-output pairs

21. Backpropagation works by propagating:

A) Inputs backward
B) Error backward
C) Outputs backward
D) Weights backward

Answer: B) Error backward

22. Overfitting occurs when a network:

A) Learns training data too closely
B) Learns very little
C) Has no hidden layer
D) Has fewer neurons

Answer: A) Learns training data too closely

23. Which technique improves generalization?

A) Overtraining
B) Cross-validation
C) Increasing error
D) Random pruning

Answer: B) Cross-validation

24. Hessian-based methods belong to:

A) First-order optimization
B) Second-order optimization
C) Competitive learning
D) Hebbian learning

Answer: B) Second-order optimization

25. Backpropagation is most commonly associated with:

A) Multilayer Perceptrons
B) Single-Layer Perceptrons
C) SOM Networks
D) Boltzmann Machines

Answer: A) Multilayer Perceptrons

Fill in the Blanks

1. Backpropagation is used for training _____ networks.
   Answer: Multilayer
2. Backpropagation learning is based on _____ correction.
   Answer: Error
3. The gradient is computed using _____.
   Answer: Differentiation
4. The Hessian Matrix contains _____ order derivatives.
   Answer: Second
5. Hessian Matrix describes the _____ of the error surface.
   Answer: Curvature
6. The ability to perform well on unseen data is called _____.
   Answer: Generalization
7. Cross-validation uses a _____ dataset.
   Answer: Validation
8. Cross-validation helps reduce _____.
   Answer: Overfitting
9. Network pruning removes unnecessary _____ and connections.
   Answer: Neurons
10. Pruning reduces network _____.
    Answer: Complexity
11. A major virtue of backpropagation is learning _____ mappings.
    Answer: Nonlinear
12. A major limitation of backpropagation is _____ convergence.
    Answer: Slow
13. Momentum helps achieve _____ convergence.
    Answer: Faster
14. Supervised learning requires _____ outputs.
    Answer: Target
15. Training data in supervised learning consists of input-output _____.
    Answer: Pairs
16. Error is propagated in the _____ direction.
    Answer: Backward
17. Overfitting reduces _____ performance.
    Answer: Generalization
18. Hessian-based optimization methods are _____ order methods.
    Answer: Second
19. Backpropagation uses _____ descent for optimization.
    Answer: Gradient
20. Hidden layers help learn complex _____.
    Answer: Patterns
21. Validation data is not used for _____ updates.
    Answer: Weight
22. The error surface should ideally reach a global _____.
    Answer: Minimum
23. Momentum reduces oscillations during _____.
    Answer: Training
24. Network pruning improves computational _____.
    Answer: Efficiency
25. Backpropagation is a _____ learning algorithm.
    Answer: Supervised