

1. What is Deep Learning?

Deep Learning is a part of Machine Learning that uses neural networks with many layers to learn patterns from large amounts of data.

2. What is a Neural Network?

A Neural Network is a collection of connected nodes (neurons) that processes input data to predict an output by learning weights during training.

3. What is the difference between Machine Learning and Deep Learning?

Machine Learning needs manual feature extraction, while Deep Learning automatically learns features from raw data using neural networks.

4. What is the Perceptron?

Perceptron is the simplest type of neural network that can solve binary classification problems using a single neuron.

5. What is Activation Function?

Activation function decides whether a neuron should be activated or not. Common types: Sigmoid, Tanh, ReLU.

6. What is ReLU (Rectified Linear Unit)?

ReLU is an activation function that outputs the input if it's positive, otherwise outputs zero. It helps neural networks learn faster.

7. What is Forward Propagation?

Forward Propagation is the process where input data passes through the network and gives the output.

8. What is Backpropagation?

Backpropagation is the learning process where the network adjusts its weights based on the error between predicted and actual output.

9. What is Loss Function?

Loss function measures how wrong the network's prediction is. Lower loss means a better model.

10. What is CNN (Convolutional Neural Network)?

CNN is a special deep learning model mainly used for images. It automatically detects important features like edges, shapes, etc.

11. What are the important layers in CNN?

- **Convolution Layer** – Extracts features from the input.
- **Pooling Layer** – Reduces the size of the feature maps.
- **Fully Connected Layer** – Makes the final prediction.

12. What is Padding in CNN?

Padding is adding extra pixels (usually zeros) around the image to keep its size after applying convolution.

13. What is Pooling in CNN?

Pooling reduces the dimensions of the feature map while keeping the important information, like Max Pooling (taking maximum value).

14. What is RNN (Recurrent Neural Network)?

RNN is used for sequential data (like text, time series) where the output depends not only on the current input but also on previous inputs

15. What is LSTM?

LSTM (Long Short-Term Memory) is an advanced RNN that can remember information for a long time, solving the "vanishing gradient" problem.

16. What is Sentiment Analysis?

Sentiment Analysis is the task of determining if a text (like a product review) is positive, negative, or neutral.

17. What is a GAN (Generative Adversarial Network)?

GAN consists of two networks — Generator and Discriminator — that compete. Generator creates fake data, Discriminator tries to detect fake vs real.

18. What are Generator and Discriminator in GAN?

- **Generator:** Creates fake data from random noise.
- **Discriminator:** Tries to tell if input is real or fake.

19. What is Reinforcement Learning?

Reinforcement Learning is a type of learning where an agent learns by interacting with the environment and getting rewards or penalties.

20. What is the Markov Decision Process (MDP)?

MDP provides a mathematical framework to model decision-making where outcomes are partly random and partly controlled by the agent.

21. Why use Linear Regression for house price prediction?

Linear Regression is simple and effective for predicting a continuous value like house price based on given features.

22. Why CNN for image classification?

CNNs are best for images because they automatically detect important patterns like edges and shapes.

23. Why RNN for time series or text data?

RNNs have memory; they remember past inputs, making them perfect for sequential data like stock prices, text, or audio.

24. What is the use of a Confusion Matrix?

Confusion Matrix shows how well a classification model performs by showing true vs false predictions.

25. What is Hyperparameter Tuning?

It's the process of finding the best settings (like learning rate, batch size, number of layers) to improve model performance.

26. What is Overfitting? How to prevent it?

Overfitting is when a model performs well on training data but poorly on new data.
Prevent by using Dropout, Regularization, and more training data.