

Q1.) What is Linear Regression?

ANS. Linear Regression is a supervised machine learning algorithm used to model the relationship between a dependent variable (output) and one or more independent variables (input) using a straight line.

→ Equation: $y = mx + c$.

y → predicted output

x → input feature.

m → slope (relationship strength)

c → intercept.

Example: Predicting House price based on size.

Types:-

1. Simple Linear Regression (one variable)

2. Multiple Linear Regression (multiple variable)

- Linear Regression assumes a linear relationship between variables and use mathematical methods to estimate the coefficients that best fit the data.

- Deep neural networks are a type of ML Algorithm that are modeled after the structure and function of the human brain.

- They consists of multiple layers of interconnected neurons that process data and learn from it to make predictions.

Q2.) What is Deep Neural Network?

ANS. A Deep Neural Network (DNN) is a type of ML Model inspired by the Human brain.

• It consists of multiple layers of interconnected nodes called Neurons, which process data and learn pattern from it.

• It is an advanced Neural Network with multiple hidden layers between input and output layers.

Structure:-

It has 3 main type of Layers:-

1. Input Layer - It receives the input data
2. Hidden Layer (one or more layers) - It performs computations and extract features.
3. Output Layer - It generates the final prediction or Result.

Key Features:-

- Learns Complex patterns.
- Uses Activation Function.
- Inspired by Human Brain

Applications

- Image Recognition.
- speech Recognition.
- NLP.
- Prediction Problems.

Q3.) What is the Concept of Standardization?

ANS.

Standardization is a data pre-processing technique used to scale features so they have mean = 0 and standard Deviation = 1.

FORMULA:-

$$Z = \frac{x - \mu}{\sigma}$$

$$x = 1.2, \mu = 0.0, \sigma = 1.0, Z = 1.2$$

$x \rightarrow$ Original Value.

$\mu \rightarrow$ mean

$\sigma \rightarrow$ standard deviation.

◦ Why needed :-

1. Improves model Performance.
 2. Ensures all features are on same scale.
 3. Prevents features with large values from dominating.
 4. Improves accuracy and convergence during training.
- Standardization makes data normalized and comparable.

Q4.) Why Split data into train and test ?

ANS: Data is split into training and testing sets to evaluate how well a model performs on unseen data.

Training Set: Used to train the Model.

Testing set: Used to evaluate the Model Performance.

Reasons for Splitting Dataset:-

1. To check if the model generalizes well for/to new data.
2. To Avoid Overfitting, (Model Memorizes training data.)
3. To Measure accuracy using metrics like error values.
4. To ensure the Model is reliable before real World Use.

Example:-

- 80% / 70% — Training
- 20% / 30% — Testing.

→ Data Splitting ensures Fair and Accurate model Evaluation.

Q5.) Write Down the Application of Deep Neural Network?

ANS: Deep Neural Networks are widely used in many sectors:

1. Image Recognition
 - DNN for detecting objects, faces, etc.

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2. Speech Recognition.

Voice Assistants and Speech to text systems.

3. Natural Language Processing (NLP).

• NLP Applications like chatbots, translations, etc.

4. Healthcare.

• It is used in Disease Diagnosis & Medical Imaging.

5. Finance

It is used in stock market prediction and Analysis. It is used in Banking system as well.

6. Autonomous Vehicles.

• Self Driving cars.

7. Recommendation systems.

• Netflix, Amazon suggestion.

8. Fraud Detection.

Banking and Finance.

⇒ DNN's are used wherever complex pattern recognition is required.