



SHORT ANSWER QUESTIONS

1. What is cross-validation?
2. What does NLP stand for?
3. What are feature vectors?
4. What is the difference between regression and classification in machine learning?
5. Explain the concept of overfitting in machine learning.
6. What is the purpose of feature scaling in machine learning?
7. Define precision and recall in the context of binary classification.
8. What is the role of cross-validation in machine learning?
9. Differentiate between supervised and unsupervised learning algorithms.
10. What is the purpose of the activation function in a neural network?
11. Explain the bias-variance tradeoff in machine learning.
12. What is the K-nearest neighbors (KNN) algorithm, and how does it work?
13. Define the concept of regularization in machine learning.
14. What is the role of linear algebra in machine learning?
15. Define eigenvalues and eigenvectors. How are they used in machine learning?
16. What is the difference between covariance and correlation?
17. Explain the concept of gradient descent in the context of optimization.
18. What is the purpose of the cost function in machine learning algorithms?
19. What is the difference between L1 and L2 regularization?
20. Define the concept of matrix factorization.
21. Explain the concept of principal component analysis (PCA).
22. What is the significance of probability theory in machine learning?
23. Define the concept of bias in machine learning models.

LONG ANSWER QUESTIONS

1. Discuss the role of linear algebra in machine learning. Provide examples of how linear algebra concepts, such as vectors, matrices, and matrix operations, are used in machine learning algorithms.
2. Explain the concept of optimization in machine learning. Discuss commonly used optimization algorithms, such as gradient descent, and how they are applied to optimize model parameters.
3. Describe the concept of probability theory and its significance in machine learning. Discuss how probability distributions, Bayes' theorem, and probabilistic models are used in various machine learning tasks.
4. Discuss the concept of regularization in machine learning. Explain L1 and L2 regularization techniques and how they help prevent overfitting in models. Provide examples of regularization applied to linear regression or logistic regression.
5. Explain the concept of matrix factorization and its applications in machine learning. Discuss how matrix factorization is used in collaborative filtering and recommendation systems.
6. Discuss the concept of dimensionality reduction in machine learning. Explain the purpose and methods of dimensionality reduction, including principal component analysis (PCA) and t-SNE. Provide examples of how dimensionality reduction can be used in feature extraction or visualization tasks.
7. Explain the concept of kernel methods in machine learning. Discuss how kernel functions, such as the radial basis function (RBF) kernel, are used to transform data into higher-dimensional feature spaces. Provide examples of kernel methods applied to support vector machines (SVM) or kernel PCA.
8. Discuss the concept of information theory and its applications in machine learning. Explain entropy, information gain, and Kullback-Leibler (KL) divergence and how they are used in decision trees, feature selection, or generative models.
9. Explain the concept of neural networks in machine learning. Discuss the mathematical foundations of neural networks, including activation functions, feedforward and backpropagation algorithms, and gradient-based optimization. Provide examples of neural networks applied to classification or regression tasks.
10. Discuss the concept of clustering in machine learning. Explain different clustering algorithms, such as K-means and hierarchical clustering, and how distance metrics, such as Euclidean distance or cosine similarity, are used to group data points.