Definition:

> *Supervised machine learning is a type of machine learning where the model is trained on a labeled dataset.*

The labeled dataset consists of examples where each example is associated with a label.

The goal of supervised machine learning is to learn a mapping function from the input data to the corresponding labels.

This mapping function can then be used to make predictions on new, unseen data.

Types of Supervised Machine Learning

1. Classification: Classification is the task of assigning a class label to an input data point.

Example: A classification model could be used to classify emails as spam or not spam, or to classify images of handwritten digits.

2. Regression: Regression is the task of predicting a continuous numerical value.

Example: A regression model could be used to predict the price of a house based on its size, location, and other features, or to predict the future sales of a product.

Supervised Machine Learning Algorithms

Some of the most common algorithms include:

1. Linear regression: Linear regression is a simple and interpretable algorithm that can be used for both classification and regression tasks. It is a good choice for tasks where the relationship between the input data and the labels is linear.

2. Logistic regression: Logistic regression is a popular algorithm for classification tasks. It is a good choice for tasks where the labels are binary (e.g., yes/no, true/false).

3. Support vector machines (SVMs): SVMs are a powerful algorithm for both classification and regression tasks. They are known for their ability to handle high-dimensional data and their robustness to outliers.

4. Decision trees: Decision trees are a versatile algorithm that can be used for both classification and regression tasks. They are easy to interpret and can handle categorical data.

5. Random forests: Random forests are an ensemble algorithm that combines multiple decision trees to improve performance. They are a popular choice for classification and regression tasks.

Applications of Supervised Machine Learning

- Spam filtering: Can be used to filter spam emails from inboxes.
- Medical diagnosis: Can be used to diagnose medical conditions based on patient data.

- Fraud detection: Can be used to detect fraudulent transactions in financial data.
- Customer segmentation: Can be used to segment customers based on their demographics and behavior.
- Recommendation systems: Can be used to recommend products, movies, and other items to users.

Steps in Supervised Learning:

1. Data Collection: Gather a dataset containing input features and corresponding target labels.
2. Data Preprocessing: Clean, handle missing values, scale features, and split data into training and test sets.
3. Model Selection: Choose an appropriate model or algorithm based on the problem and data characteristics.
4. Model Training: The model learns from the training data by adjusting its parameters to minimize prediction errors.
5. Model Evaluation: Assess the model's performance using metrics like accuracy, MSE, precision, recall, etc., on a test set.
6. Model Tuning: Fine-tune model hyperparameters or select a different algorithm if performance is inadequate.
7. Model Deployment: Deploy the trained model to make predictions on new, unseen data in real-world applications.

References:

- Machine Learning: A Probabilistic Perspective by Kevin P. Murphy, MIT Press, 2012.

- Machine Learning: A Practical Guide by Florian Deisenroth, Faisal Abdulle, and Christopher Ong, Cambridge University Press, 2020.

Related Posts:

1. What is Machine Learning ?
2. Types of Machine Learning ?
3. Applications of Machine Learning
4. Data Preprocessing
5. Data Cleaning
6. Handling Missing Data
7. Feature Scaling
8. Labeled data in Machine learning
9. Difference between Supervised vs Unsupervised vs Reinforcement learning
10. Machine learning algorithms for Big data
11. Difference between Supervised vs Unsupervised vs Reinforcement learning
12. What is training data in Machine learning
13. What is Ordinary Least Squares (OLS) estimation
14. Scalar in Machine Learning
15. Scalars in Loss Functions | Machine Learning
16. Linear Algebra for Machine Learning Practitioners
17. Top Interview Questions and Answers for Supervised Learning
18. Define machine learning and explain its importance in real-world applications.
19. Differences Between Machine Learning and Artificial Intelligence
20. Machine Learning works on which type of data ?
21. What is target variable and independent variable in machine learning
22. Machine Learning Scope and Limitations
23. What is Regression in Machine learning

24. Statistics and linear algebra for machine learning

25. Finding Machine Learning Datasets

26. What is hypothesis function and testing

27. Explain computer vision with an appropriate example

28. Explain Reinformcement learning with an appropriate exaple

29. Reinforcement Learning Framework

30. Data augmentation

31. Normalizing Data Sets in Machine Learning

32. Machine learning models

33. Unsupervised machine learning

34. Neural Network in Machine Learning

35. Recurrent neural network

36. Support Vector Machines

37. Long short-term memory (LSTM) networks

38. Convolutional neural network

39. How to implement Convolutional neural network in Python

40. What is MNIST ?

41. What does it mean to train a model on a dataset ?

42. Can a textual dataset be used with an openCV?

43. Name some popular machine learning libraries.

44. Introduction to Machine Learning

45. Some real time examples of machine learning

46. Like machine learning, what are other approaches in AI ?