Machine Learning

Paris (France)

30 September - 4 October 2024

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Machine Learning

Introduction

Machine Learning is a subset of artificial intelligence AI that focuses on developing algorithms and statistical models that enable computers to learn and improve their performance on a specific task without being explicitly programmed for that task. The core idea behind Machine Learning is to allow computers to learn from data and experiences, adapt to new input, and make decisions or predictions based on that learning.

Course Objectives

Understand the basic concepts of Machine Learning, including supervised, unsupervised, and reinforcement learning paradigms.
Learn how to preprocess and explore data to make it suitable for Machine Learning models.
Gain familiarity with popular Machine Learning algorithms and their application in different scenarios.
Develop the ability to evaluate and fine-tune Machine Learning models to achieve optimal performance.
Apply Machine Learning techniques to real-world projects and solve complex problems.

Course Outlines

Day 1
Introduction to Machine Learning

- What is Machine Learning? Understanding the key concepts and its significance in various industries.
- Types of Machine Learning: Supervised, Unsupervised, and Reinforcement Learning.
- Data Preparation: Data collection, cleaning, and feature engineering.
- Introduction to Python Libraries for Machine Learning: NumPy, Pandas, and Scikit-learn.
- Hands-on: Setting up the development environment and exploring datasets.

Day 2
Supervised Learning Algorithms

- Linear Regression: Modeling relationships between variables and making predictions.
- Logistic Regression: Binary classification and probability estimation.
- Decision Trees and Random Forests: Building and ensembling decision-making models.
- Evaluation Metrics: Accuracy, precision, recall, F1-score, and ROC curves.

- Hands-on: Implementing supervised learning algorithms on sample datasets.

Day 3
Unsupervised Learning Algorithms

- K-Means Clustering: Grouping similar data points together.
- Hierarchical Clustering: Creating cluster hierarchies in data.
- Dimensionality Reduction: Principal Component Analysis PCA and its applications.
- Anomaly Detection: Identifying rare instances in data.
- Hands-on: Applying unsupervised learning techniques to real-world datasets.

Day 4
Advanced Machine Learning Techniques

- Support Vector Machines SVM: Maximizing decision boundaries for classification.
- Neural Networks and Deep Learning: Introduction to artificial neural networks.
- Model Selection and Hyperparameter Tuning: Cross-validation and Grid Search.
- Handling Imbalanced Data: Techniques to address class imbalance issues.
- Hands-on: Building neural networks and fine-tuning models.

Day 5
Special Topics in Machine Learning

- Natural Language Processing NLP: Text analysis and sentiment classification.
- Recommender Systems: Building personalized recommendation engines.
- Time Series Analysis: Predicting future trends from time-ordered data.
- Deploying Machine Learning Models: Integrating models into applications.
- Hands-on: Working on a complete Machine Learning project from start to finish.

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