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AI & DATA

Module 1: Introduction to the World of AI and Data

Objective: Tosparkcuriosity andprovide ahigh-level,conceptual map of the field, establishing a common vocabulary.

Session 1: Introduction to Artificial Intelligence_

- Explore what AI is, its history, and different types (ANI, AGI, ASI) through interactive activities like “AI Detective” and Google’s AI experiments.

Session 2: The AI Family Tree

- Understand the main subfields of AI - Machine Learning, Deep Learning, NLP, and Computer Vision- via engaging classification activities.

Session 3: Data - The Lifeblood of AI_

- Learn the importance and types of data, key terms like instance, feature, and label, and analyze a sample dataset to identify these elements.

Module 2: Python for Data Science

Objective:To build astrongfoundationinPythonfor data analysis and problem-solving.

Session 4: Your First Steps with Python_

- Get introduced to Google Colab and learn basic Python concepts like variables, data types, printing, and commenting through guided exercises.

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Session 5: Storing Collections of Data

- Learn how to create, access, and manage lists and dictionaries to organize data efficiently.

Session 6: Controlling the Flow of Your Program

- Master conditional statements and loops to control program logic and repetition effectively.

Session 7: Creating Reusable code with Functions

- Understand how to define and use functions to write organized, reusable code that performs specific tasks.

Module 3: Telling Stories with Data

Objective:Usedatasciencelibrariestoclean,analyze, and visualize data to uncover insights

Session 8: Introducing the Power of Pandas

- Learn how to load, inspect, and explore datasets using Pandas and basic DataFrame operations.

Session 9: Manipulating Data with Pandas

- Practice selecting, filtering, and cleaning data, handling missing values, and performing analysis tasks with real datasets.

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Session 10: The Art of Data Visualization

- Create meaningful visualizations using Matplotlib and Seaborn to tell data -driven stories.

Session 11: Uncovering Insights with Statistics

- Explore key statistical concepts like mean, median, mode, and correlation to draw insights responsibly from data.

Module 4: The Core of Machine Learning

Objective: Learn fundamental ML principles and build predictive models using Python

Session 12: The Three Paradigms of Machine Learning

- Understand supervised, unsupervised, and reinforcement learning through relatable examples and problem classification.

Session 13: The Supervised Learning Workflow with Python

- Learn the Scikit-learn process- training, testing, predicting, and evaluating models effectively.

Session 14: Classification Models in Action I- Decision Trees

- Learn the Scikit-learn process- training, testing, predicting, and evaluating models effectively.

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Session 15: Classification in Action II – K-Nearest Neighbors (KNN)

- Explore the KNN algorithm, train models, and compare results with Decision Trees.

Session 16: Evaluating Your Classifier – Accuracy Isn't Enough

- Learn to evaluate models beyond accuracy using precision, recall, F1-score, and confusion matrices.

Session 17: Regression Models in Action

- Build Linear Regression models to predict continuous outcomes and measure accuracy with MAE.

Session 18: Unsupervised Learning – Finding Hidden Groups

- Use K-Means clustering to uncover hidden patterns and visualize clusters in data.

Module 5: Advanced Machine Learning Techniques

Objective: Explore ensemble methods that enhance prediction accuracy and reliability.

Session 19: The Power of the Crowd – Ensemble Learning

- Learn how Random Forest and ensemble methods improve performance by combining multiple models.

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Module 6: A Glimpse into the Future – Deep Learning

Objective:Understandneuralnetworksandgainhands-onexperience in deep learning.

Session 20: Introduction to Neural Networks

- Discover how artificial neurons form complex networks and experiment interactively using TensorFlow Playground.

Session 21: Hands-On Deep Learning for Image Recognition

- Build, train, and test a neural network using Keras and the MNIST dataset to recognize handwritten digits.

Module 7: Capstone Project and AI for Good

Objective: Apply all learned skills in a project and reflect on AI's social impact.

Session 22: AI as Your Co-Pilot – Using Generative AI

- Learn to use LLMs like ChatGPT for coding assistance, concept explanation, and ethical AI use.

Session 23: The Capstone Project – Ideation and Planning

- Brainstorm project ideas, define problem statements, and select datasets for analysis.

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Session 24: Project Workshop I – Data Preparation and Exploration

- Perform data cleaning, visualization, and exploration as part of hands-on project work.

Session 25: Project Workshop II – Modeling and Evaluation

- Build and evaluate machine learning models on your chosen data and interpret results.

Session 26: AI Ethics and Responsibility

- Explore fairness, transparency, and bias in AI systems through discussions and case studies.

Session 27: Storytelling and Presentation

- Learn to present project insights clearly and compellingly, focusing on narrative and impact.

Session 28: Final Presentations and Course Wrap-Up

- Present final projects, reflect on learnings, and discuss pathways for future exploration in AI and Data Science.

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