AI & ML Course

Webcooks®



01. Introduction to Artificial Intelligence

- What is Artificial Intelligence?
- History and Evolution of AI
- AI vs Machine Learning vs Deep Learning
- Types of Artificial Intelligence
  - Narrow AI
  - General AI — Concept
  - Superintelligence — Concept
- AI Applications in the Real World
- AI in Business and Industry
- AI Tools and Platforms
- AI Development Lifecycle
- Limitations and Challenges of AI
- AI Ethics and Responsible AI

02. Python for AI

- Python Environment & Virtual Environments
- Python Programming Fundamentals
- Functions and Modules
- Object-Oriented Programming
- Exception Handling
- File Handling
- JSON Data
- Working with APIs
- HTTP Requests
- REST APIs
- Environment Variables
- Package Management with pip
- Introduction to Async Programming
- async and await
- Since Python is already covered in your Data Analyst course, this module can be shortened or treated as a prerequisite.

03. Mathematics & Data Concepts for AI

- Vectors and Matrices
- Basic Matrix Operations
- Functions
- Probability Fundamentals
- Mean, Median and Standard Deviation
- Probability Distributions
- Correlation
- Basic Calculus Concepts
- Derivatives
- Gradients
- Introduction to Optimization
- Understanding Data in AI Systems

04. Introduction to Generative AI

- What is Generative AI?
- Traditional AI vs Generative AI
- Generative AI Applications
- Text Generation
- Image Generation
- Audio Generation
- Video Generation
- Code Generation
- Generative AI Models
- Foundation Models
- Multimodal AI
- AI Models vs AI Applications
- Popular Generative AI Tools

05. Large Language Models (LLMs)

- What is an LLM?
- How LLMs Work — High-Level Understanding
- Tokens and Tokenization
- Context Windows
- Embeddings
- Parameters
- Training vs Inference
- Pre-training
- Fine-tuning — Introduction
- Instruction Tuning
- LLM Capabilities and Limitations
- Hallucinations
- LLM Model Selection
- Open-Source vs API-Based Models

06. Prompt Engineering

- What is Prompt Engineering?
- Anatomy of a Good Prompt
- Zero-Shot Prompting
- One-Shot Prompting
- Few-Shot Prompting
- Role Prompting
- Context and Instructions
- Structured Prompts
- Output Formatting
- JSON Responses
- Chain-of-Thought — Conceptual Understanding
- Prompt Chaining
- Few-Shot Examples
- Prompt Templates
- Improving and Testing Prompts
- Common Prompting Mistakes

Practical Applications:

- Content Generation
- Data Analysis
- Text Summarization
- Information Extraction
- Classification
- Translation
- Code Generation
- Document Processing

07. Introduction to Machine Learning

- What is Machine Learning?
- AI vs Machine Learning vs Deep Learning
- Applications of Machine Learning
- Types of Machine Learning
  - Supervised Learning
  - Unsupervised Learning
  - Semi-Supervised Learning
  - Reinforcement Learning — Introduction
- Machine Learning Workflow
- Machine Learning Lifecycle
- Real-World Machine Learning Problems
- Training Data, Testing Data & Validation Data
- Features and Target Variables

08. Python for Machine Learning

- Python Environment & Jupyter Notebook
- NumPy for Numerical Computing
- Pandas for Data Manipulation
- DataFrames and Series
- Importing CSV, Excel & Other Data
- Data Exploration and Inspection
- Data Cleaning
- Handling Missing Values
- Handling Duplicate Data
- Data Type Conversion
- Data Filtering and Transformation
- Matplotlib & Seaborn Basics

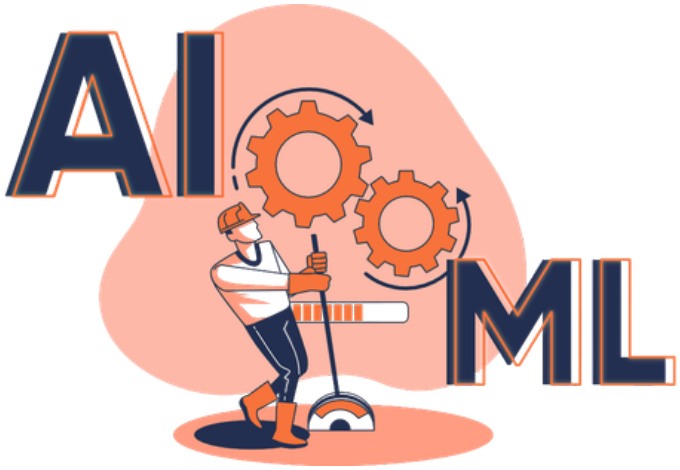
Libraries/Tools: Python, Jupyter Notebook, NumPy, Pandas, Matplotlib, Seaborn

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09. Mathematics & Statistics for Machine Learning

- Descriptive Statistics
- Mean, Median & Mode
- Range, Variance & Standard Deviation
- Percentiles and Quartiles
- Interquartile Range (IQR)
- Probability Fundamentals
- Probability Distributions
- Normal Distribution
- Correlation and Covariance
- Outliers
- Sampling
- Basic Linear Algebra
  - Vectors
  - Matrices
  - Matrix Operations
- Introduction to Calculus for ML
  - Functions
  - Derivatives
  - Gradient Concept

Libraries/Tools: NumPy, Pandas, SciPy, Matplotlib



10. Data Preprocessing

- Understanding Dataset Structure
- Feature Selection
- Handling Missing Values
- Handling Outliers
- Encoding Categorical Data
- Label Encoding
- One-Hot Encoding
- Feature Scaling
- Standardization
- Normalization
- Train-Test Split
- Validation Data
- Data Leakage
- Building a Preprocessing Pipeline

Libraries/Tools: Pandas, NumPy, Scikit-learn

11. Supervised Learning – Regression

- Introduction to Supervised Learning
- Regression Problems
- Simple Linear Regression
- Multiple Linear Regression
- Polynomial Regression
- Regression Model Training
- Prediction
- Regression Metrics
  - MAE
  - MSE
  - RMSE
  - R^2 Score
- Underfitting and Overfitting
- Bias-Variance Concept
- Regularization
  - Ridge Regression
  - Lasso Regression

Practical Projects:

- House Price Prediction
- Salary Prediction
- Sales Prediction

Libraries/Tools: Pandas, NumPy, Scikit-learn, Matplotlib, Seaborn

12. Supervised Learning – Classification

- Introduction to Classification
- Binary Classification
- Multiclass Classification
- Logistic Regression
- K-Nearest Neighbors (KNN)
- Decision Trees
- Random Forest
- Support Vector Machines (SVM)
- Classification Predictions
- Classification Metrics
  - Accuracy
  - Precision
  - Recall
  - F1 Score
- Confusion Matrix
- ROC Curve & AUC
- Classification Thresholds

Practical Projects:

- Customer Churn Prediction
- Loan Approval Prediction
- Email Spam Classification
- Employee Attrition Prediction

Libraries/Tools: Pandas, NumPy, Scikit-learn, Matplotlib, Seaborn

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