

Machine Learning Fundamentals in a Day

Note: Pre-requisite course for any AI advanced course

Duration: 08 hours (1 hour break)

Additional Resources to be provided by trainers:

- Reading Materials: Recommended books and articles
- Online Resources: official documentation
- Tools and Libraries: Python libraries for machine learning
- **Koenig DC for lab performance will be provided for the same**

Module 1: Introduction to Python for Machine Learning (0.5 hour)

- Overview of Python
 - Why Python for machine learning?
 - Key features and benefits
- Setting up the Environment
 - Installing Python
 - Setting up Jupyter Notebook/Google Colab
- Basic Syntax
 - Variables and data types
 - Basic operations

Module 2: Python Data Structures (1 hour)

- Lists, Tuples, and Dictionaries
 - Creating and manipulating lists
 - Understanding tuples
 - Using dictionaries
- Operations on Data Structures
 - Indexing and slicing
 - Iterating through data structures
 - Common methods and functions

Module 3: Control Flow and Functions (1 hour)

- Control Flow
 - If-else statements
 - Loops (for, while)
- Functions
 - Defining and calling functions
 - Parameters and return values
 - Lambda functions

Module 4: Introduction to NumPy (1 hour)

- NumPy Basics
 - Importance of NumPy in machine learning
 - Creating arrays
- Array Operations
 - Indexing and slicing
 - Mathematical operations on arrays
- Advanced NumPy
 - Broadcasting
 - Working with multi-dimensional arrays

Module 5: Data Manipulation with pandas (1 hour)

- Introduction to pandas
 - Importance of pandas in data science
 - DataFrames and Series
- DataFrame Operations
 - Loading and inspecting data
 - Indexing and selecting data
 - Handling missing values
- Advanced pandas
 - Grouping and aggregation
 - Merging and joining DataFrames

Module 6: Data Visualization (1 hour)

- Introduction to Matplotlib
 - Plotting basics
 - Creating different types of plots (line, bar, histogram)
- Introduction to Seaborn
 - Statistical data visualization
 - Creating attractive and informative visualizations

Module 7: Introduction to Machine Learning Concepts (0.5 hour)

- What is Machine Learning?
 - Definition and types (supervised, unsupervised, reinforcement)
 - Key concepts and terminology
- Scikit-Learn Basics
 - Overview of the library
 - Key features and benefits
- Building a Simple Model
 - Data preparation
 - Training a model
 - Making predictions
 - Evaluating the model
- Discussion about other frameworks

- Tensorflow
- Pytorch
- Transformers
- GAN
- Diffusers

Module 8: Mini Project (1 hour)

- Mini Project
 - Choose a simple machine learning problem (classification, regression or clustering)
 - Provide the student a dataset based on the problem selected
 - Demonstrate and share the solution based on his choice
 - Guide students for building a ML model (homework if time is constraint)