Week 1: Introduction to Data Science and Machine Learning

Day 1: Introduction to Data Science and Machine Learning

- Overview of Data Science
- Fundamentals of Machine Learning
- Types of Machine Learning Algorithms
- Applications of Data Science and Machine Learning
- Introduction to Python programming language
- Setting up Python environment
- Running the first Python program

Day 2: Introduction to Python

- Basic syntax and data types in Python
- Working with variables and operators
- Using built-in functions and libraries
- Conditional statements: IF Else

Day 3: Data Manipulation with Python

- Lists, tuples, and dictionaries
- Loops
- User-defined functions
- Functions such as map, filter, lambda

Week 2: Data Analysis using Python

Day 1: Knowing about the Numpy and Pandas and Required Libraries.

- Numpy
- Pandas

Day 2: Data Cleaning and Preprocessing with Pandas

- Import and Exporting data
- Handling missing data
- Removing duplicates and dealing with Outliers
- Cleaning and adjustments in data

Day 3: Exploratory Data Analysis (EDA) with Pandas/Numpy

- Descriptive Statistics and data summarization
- Grouping and Aggregating data
- SQL-like operation in data

Week 3: Working on Data with Python

Day 1: Data Visualization with Matplotlib/Seaborn

- Creating Basic Plots (line plots, scatter plots, histograms)
- Customizing and Styling Visualizations
- Creating Informative and Aesthetically Pleasing Visualizations
- Pair plots, Heatmaps, and Advanced Plotting technique

Day 2: Final Project and Case Studies

- Participants work on a real-world data analysis project
- Applying learned Python skills to analyze and visualize data

Day 3: Data Preprocessing and Exploration

- Feature Engineering / Selection

Week 4: Introduction to math in data science

Day 1: Probability and Statistics

- Basic Probability Concepts
- Random Variables
- Probability Distributions
- Statistical Inference
- Hypothesis Testing
- Regression Analysis

Day 2: Statistical Analysis with Python

- Measures of central tendency and dispersion
- Hypothesis testing and confidence intervals
- Correlation and regression analysis
- ANOVA and chi-square tests

Day 3: Statistical Analysis with Scipy

- Introduction to statistical tests and hypothesis testing
- Implementing statistical tests in Python

Week 5: Starting with Machine Learning - Supervised Learning

Day 1: Supervised learning

- Classification
- Naive Bayes , KNN Classifier- with Practical

Day 2: Decision tree, Logistic regression

- Decision tree

Day 3: SVM

- SVM with Practical

Week 6: Classification and Regression

Day 1: Linear regression

- Linear regression - Practical

Day 2: Types of linear regression

- Lasso & Ridge

Day 3: Logistics Regression and Hyparameter Tuning/Cross Validation

- Non-linear regression

Week 7: Unsupervised learning model

Day 1: PCA and Types of Clustering Model

- PCA and Types of clustering model and evaluation

Day 2: K-means algo + Agglomerative

- K-means algo
- Agglomerative Clustering

Day 3: Associative rules

- Market Basket analysis

Week 8: Advanced models and Optimization

Day 1: Ensemble Models

- Bagging

Day 2: Ensemble models

- Boosting

Day 3: Hyperparameter Tuning

- Boosting and Stacking

Week 9: Model Evaluation, Optimization and Validation

Day 1: Hyperparameter Tuning

- Hyperparameter Tuning

Day 2: Model Selection Method

- Model selection method

Day 3: Advance Models-1

- Reinforcement Learning
- Time Series Analysis

Week 10: Introduction to Advanced Topics in Machine Learning

Day 1: Advance Models-2

- Anomaly Detection
- Recommendation Systems

Day 2: Natural Language Processing

- Text-based operations
- Working on text data

Day 3: Deep Learning

- Neuron, Neural Network and why DNN
- ANN, CNN, RNN, TRANSFER LEARNING

Week 11: Introduction to GenAI and LLMs

Day 1: Introduction of GenAI and LLMS

- Attention mechanisms
- transformer architecture
- fine-tuning and training

Day 2: LLM Architecture and Training

- Encoder and decoder
- self-attention layer
- training methodologies
- tokenization, vocab, and embedding layers.

Day 3: Application Development with LLMS

- Integrate LLMS into applications
- APIs
- backend and user interface

Week 12: Prompt Engineering

Day 1: Prompt Engineering

- Crafting Effective Prompts
- Contextual Prompting
- Evaluating Prompt Effectiveness

Day 2: Developing a simple application using LLMS

- Project- Chatbot using LLMs

Day 3: Deployment of Model Using Streamlight

- Deployment of the model using Streamlit