Advanced techniques in Machine Learning

Duration: 10 days

Module 1: Structured Data Analysis and Data Wrangling

- Data Preparation

- Data Validation

- Feature Selection

- Feature Engineering

- Hands-on Exercises

Module 2: Statistical Analysis

- Hypothesis Testing

  - Z-tests

  - t-tests

  - Chi-square tests

- Confidence Intervals

- ANOVA (Analysis of Variance)

- Hands-on Exercises

Module 3: Univariate and Multivariate Analysis

- Descriptive Statistics

- Correlation and Covariance

- Regression Analysis

- Hands-on Exercises

Module 4: Natural Language Processing (NLP)

- Text Classification

- Document Clustering

- Sentiment Analysis

- One-Shot and Few-Shot Learning

- Hands-on Exercises

Module 5: Computer Vision using PyTorch

- Object Detection

- Object Recognition

- Image Segmentation

- Optical Character Recognition (OCR) Modeling

- Hands-on Exercises

Module 6: Generative AI and Large Language Models (LLMs)

- Model Architectures

- Prompt Engineering

- Fine Tuning

- Retrieval-Augmented Generation (RAG)

- Text Embedding

- Vector Database Setup

- Model Evaluation

- Hands-on Exercises

Module 7: Machine Learning Model Lifecycle

- Model Retraining

- Performance Tuning

- Model Deployment

- Hands-on Exercises using Python and PyTorch

Module 8: Classification Problem Project

- Problem Statement

- Data Preparation

- Data Validation

- Feature Selection

- Feature Engineering

- Model Building

- Model Testing

- Evaluation Criteria