Machine Learning Training and Internship Program Syllabus

15 Days (Introduction to Machine Learning)

Objective:

- Understand the fundamentals of machine learning and build a basic model.

Syllabus:

1. **Day 1-3:** Introduction to ML
    a. What is ML? Types (Supervised, Unsupervised, Reinforcement Learning).
    b. Basic Python for ML: NumPy, pandas, and matplotlib.
2. **Day 4-6:** Data Preprocessing
    a. Handling missing data, encoding categorical data, scaling features.
    b. Introduction to data visualization with seaborn.
3. **Day 7-9:** Linear Regression
    a. Simple linear regression.
    b. Implementing linear regression with Python (scikit-learn).
4. **Day 10-12:** Classification Basics
    a. Logistic regression.
    b. Evaluating models with accuracy, precision, recall, and F1-score.
5. **Day 13-15:** Hands-On Mini Project
    a. Predict house prices using linear regression.
    b. Classification of Iris dataset.

30 Days (Beginner-Level ML)

Objective:

- Develop foundational ML models and understand essential concepts.

Syllabus:

1. **Week 1:** Python and Statistics for ML
    a. Advanced Python libraries for ML (scikit-learn, pandas).
    b. Descriptive and inferential statistics for data analysis.
2. **Week 2:** Supervised Learning Models
    a. Decision trees and random forests.

    b. Support vector machines (SVM).
3. **Week 3:** Unsupervised Learning Models
    a. Clustering with K-means and hierarchical clustering.
    b. Dimensionality reduction using PCA.
4. **Week 4:** Mini Project
    a. Customer segmentation using clustering techniques.

45 Days (Intermediate-Level ML)

Objective:

- Work on intermediate ML concepts, hyperparameter tuning, and model evaluation.

Syllabus:

1. **Week 1:** Advanced Regression Techniques
    a. Polynomial regression.
    b. Ridge and Lasso regression.
2. **Week 2:** Advanced Classification Techniques
    a. K-Nearest Neighbors (KNN).
    b. Naive Bayes and ensemble techniques (Bagging, Boosting).
3. **Week 3:** Model Evaluation and Tuning
    a. Cross-validation techniques.
    b. Hyperparameter tuning (GridSearchCV, RandomizedSearchCV).
4. **Week 4-5:** Hands-On Project
    a. Fraud detection using classification algorithms.

60 Days (Advanced ML Development)

Objective:

- Dive into advanced ML techniques, including neural networks and real-world applications.

Syllabus:

1. **Week 1-2:** Neural Networks Basics
    a. Understanding perceptrons and multilayer perceptrons (MLPs).
    b. Implementing basic neural networks with TensorFlow/Keras.
2. **Week 3:** Time Series Analysis

    a. Introduction to time series data.
    b. Forecasting using ARIMA and LSTMs.
3. **Week 4:** Natural Language Processing (NLP)
    a. Text preprocessing techniques (stemming, lemmatization, tokenization).
    b. Sentiment analysis using NLP libraries (NLTK, spaCy).
4. **Week 5-6:** Advanced Project
    a. Predicting stock prices using LSTMs.
    b. Build a sentiment analysis model for product reviews.

90 Days (Comprehensive ML Development)

Objective:

- Gain expertise in ML with a focus on deep learning and large-scale deployment.

Syllabus:

1. **Week 1-3:** Deep Learning Concepts
    a. Convolutional Neural Networks (CNNs) for image recognition.
    b. Recurrent Neural Networks (RNNs) for sequence modeling.
2. **Week 4-6:** Model Deployment
    a. Model serialization using pickle and joblib.
    b. Deploying models with Flask or FastAPI.
3. **Week 7-9:** Capstone Project
    a. Build an image classification system using CNNs.
    b. Develop a chatbot using NLP techniques and deploy it.

180 Days (Expert-Level ML Development)

Objective:

- Achieve mastery in ML, deep learning, and real-world large-scale applications.

Syllabus:

1. **Month 1-2:** Advanced Machine Learning
    a. Ensemble learning: Gradient Boosting, XGBoost, and CatBoost.
    b. Handling imbalanced datasets (SMOTE, ADASYN).

2. **Month 3-4:** Advanced Deep Learning
    a. Transfer learning with pre-trained models (VGG, ResNet).
    b. Generative Adversarial Networks (GANs) for data generation.
3. **Month 5:** Advanced NLP
    a. Sequence-to-sequence models with attention mechanisms.
    b. Transformers (BERT, GPT).
4. **Month 6:** Industry-Level Applications
    a. Build a recommendation system (collaborative filtering).
    b. End-to-end project deployment on cloud platforms (AWS, Azure, GCP).

Common Features Across Durations:

- **Hands-On Practice:** Every module includes coding assignments and quizzes.
- **Assessments:** Weekly assessments to evaluate understanding.
- **Capstone Projects:** Real-world problems for practical application.