Training Day 14 Report

Date: 10 July 2025

Topic: Introduction to Machine Learning

Overview

Today's session introduced the fundamental concepts of **Machine Learning (ML)**. Machine Learning is a branch of Artificial Intelligence (AI) that enables computers to learn from data and improve performance without being explicitly programmed.

Key Concepts

1. **What is Machine Learning?**
    - A process of training models on historical data to make predictions or decisions.
    - Example: Predicting whether a passenger survived on the Titanic based on features like age, gender, and class.
2. **Types of Machine Learning:**
    - **Supervised Learning** – The model learns from labeled data (input → output).
        - Examples: Predicting house prices, spam detection.
    - **Unsupervised Learning** – The model finds hidden patterns in unlabeled data.
        - Examples: Customer segmentation, clustering.
    - **Reinforcement Learning** – The model learns by interacting with an environment using trial and error.
        - Examples: Game playing, robotics.
3. **Basic Terminology:**
    - **Dataset** – Collection of data used to train and test models.
    - **Features** – Input variables (e.g., Age, Fare, Gender).

- **Labels/Target** – Output variable (e.g., Survival: 0 or 1).
- **Model** – Mathematical representation that maps inputs to outputs.
- **Training & Testing** – Splitting data to train the model and evaluate performance.

4. **Machine Learning Workflow:**
   - Data Collection → Data Preprocessing → Model Selection → Training → Evaluation → Deployment.

Simple supervised learning example

```
# Step 1: Import libraries
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score


# Step 2: Load Titanic dataset (sample dataset)
data = {
    'Age': [22, 38, 26, 35, 28],
    'Sex': [0, 1, 1, 1, 0],   # 0 = male, 1 = female
    'Fare': [7.25, 71.83, 7.92, 53.1, 8.05],
    'Survived': [0, 1, 1, 1, 0]
}
df = pd.DataFrame(data)
# Step 3: Split features and target
X = df[['Age', 'Sex', 'Fare']]    # features
y = df['Survived']                # target
```

```
# Step 4: Train-Test Split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=42)

# Step 5: Train Logistic Regression Model
model = LogisticRegression()
model.fit(X_train, y_train)

# Step 6: Make Predictions
y_pred = model.predict(X_test)

# Step 7: Evaluate Model
print("Predictions:", y_pred)
print("Accuracy:", accuracy_score(y_test, y_pred))
```

Learning Outcome

- Understood the **definition and purpose** of Machine Learning.
- Learned about **types of ML (Supervised, Unsupervised, Reinforcement)**.
- Got familiar with **common terminology** (features, labels, dataset, training, testing).
- Understood the **workflow of an ML project**.