ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

TRAINING TR-102 REPORT DAY 14 10 JULY 2025

Overview:

The fourteenth day of training focused on Logistic Regression, one of the most widely used algorithms in supervised machine learning, especially for classification problems.We learned how Logistic Regression is used to predict categorical outcomes, such as “yes/no” or “true/false,” using mathematical modeling and probability concepts.

Learning Objectives:

• Understand the concept and purpose of Logistic Regression.

• Learn how Logistic Regression differs from Linear Regression.

• Explore the role of the Sigmoid (Logistic) Function.

• Implement Logistic Regression in Python using scikit-learn.

• Evaluate model performance using metrics such as accuracy, precision, and recall.

Introduction to Logistic Regression

Logistic Regression is a supervised classification algorithm used to predict the probability of a binary outcome (1 or 0, Yes or No, True or False).Instead of fitting a straight line like Linear Regression, Logistic Regression fits an S-shaped curve using the Sigmoid Function to map predictions to probabilities between 0 and 1.

Applications of Logistic Regression

1. **Healthcare:** Predicting disease presence (e.g., diabetes detection).
2. **Marketing:** Customer purchase probability prediction.
3. **Finance:** Loan default prediction.

4. Social Media: Spam and content moderation.

5. AI/ML: Baseline model for binary and multi-class classification.

Applications of Linear Regression

1. **Predictive Analytics:** Estimating future trends, like sales forecasting.
2. **Economics:** Predicting GDP growth, inflation, or interest rates.
3. **Healthcare:** Estimating disease progression or patient outcomes.
4. **Business:** Modeling the relationship between advertising and sales.
5. **AI and ML:** Used as a baseline model for regression tasks before complex models are applied.

Conclusion:

Day 14 provided an in-depth understanding of Logistic Regression — a fundamental algorithm in classification tasks.

We learned how it models probability using the sigmoid function, differentiates between classes, and evaluates results using accuracy and recall.This session bridged the transition from regression-based prediction to classification-based learning, helping us understand how AI systems make binary and multi-class decisions.