

Training Day 9 Report:

Date: 7 July, 2025 (Friday)

Location: PG Block HPC Lab

Guided by: Training Instructors (Classroom-Based)

Main Objective:

To develop a fundamental understanding of machine learning concepts, supervised vs unsupervised/reinforcement learning, and key algorithms including linear regression, classification, clustering, and basics of neural networks.

Summary of the Day's Work

Today's session explained how machine learning models learn from data, their training and testing phases, and differences between traditional programming and ML. Detailed practical work introduced regression and error metrics using Python and scikit-learn.

Topics/Areas Covered:

- Introduction to Machine Learning
- Traditional Programming vs. Machine Learning
- AI vs ML vs Deep Learning
- Training vs Testing Phase
- **Types of ML:**
 - Supervised Learning (Classification, Regression)
 - Unsupervised Learning (Clustering, Association)
 - Reinforcement Learning (Reward-based Learning)

- **ML Algorithms:**

- ☐ Linear & Logistic Regression
- ☐ Decision Tree, Random Forest, SVM
- ☐ K-Means, K-NN, Hierarchical Clustering, PCA
- ☐ Apriori Algorithm Basics of Neural Networks

Concepts Learned:

- ML models learn from data and improve over time.
- Supervised learning uses labeled data; unsupervised does not.
- Reinforcement learning is based on reward-feedback loop.
- Regression predicts values; classification predicts categories.
- Clustering helps in grouping similar data points.
- Neural networks are the base of deep learning models.

Tools / Platforms Used

- Google Colab / Jupyter Notebook
- Python 3.x
- Libraries: pandas, sklearn, numpy, matplotlib

Tasks Assigned:

- Wrote differences between Supervised, Unsupervised, and Reinforcement Learning.
- Practiced Linear Regression with a sample dataset.
- Calculated Mean Squared Error (MSE).
- Understood residuals and plotted regression line.

Observations / Reflections

Today gave me a solid understanding of how ML works and the variety of algorithms available. The hands-on with regression helped me understand error metrics and prediction accuracy.

Key Takeaways

- Built foundational skills in applying ML models in Python.
- Understood all three ML paradigms and major algorithms.
- Developed practical confidence in regression analysis and evaluation.