

Lab 7

School of Computer Science Engineering and Technology

Course: B. Tech.	Type: Core
Course Code: CSET301	Course Name: Artificial Intelligence and Machine Learning
Year: 2025	Semester: Odd
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CO-Mapping

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Lab Assignment 7: Comparative Study of Linear Regression and Polynomial Regression

Objective:

To understand and compare the performance of linear regression and polynomial regression models on a dataset by evaluating key performance metrics including R^2 (coefficient of determination) and MAE (Mean Absolute Error).

Dataset:

You may use the publicly available dataset:

https://raw.githubusercontent.com/AdiPersonalWorks/Random/master/student_scores%20-%20student_scores.csv

Instructions:

1. Data Loading and Preprocessing:
 - Load the dataset.
 - Identify features (independent variables) and target (dependent variable).
2. Model Implementation:
 - Implement Linear Regression from scratch or using libraries.
 - Implement Polynomial Regression (choose polynomial degree 2 or 3 for comparison).
3. Training and Prediction:
 - Split the dataset into training and testing sets.
 - Train both models on the training data.
 - Predict outputs on the test set.
4. Performance Metrics Calculation:

Calculate and compare the following metrics for both models:

- R^2 (Coefficient of Determination): Measures how well the regression predictions approximate the real data points.
- MAE (Mean Absolute Error): Measures the average magnitude of errors in predictions, without considering their direction.

5. Plotting:

- Plot the data points along with both regression lines/curves.
- Visualize and interpret the fit of each model.

6. Discussion:

- Compare the strengths and weaknesses of linear vs. polynomial regression based on metrics and plots.
- Discuss when polynomial regression might be preferred.
- Relate findings with overfitting and underfitting concepts.