# EXP-6-Python Lab Question

**Objective:** Use the provided dataset to design and evaluate multiple regression models.

**Dataset:** The dataset contains 1000 instances, with six continuous attributes (`Feature_1` to `Feature_6`) and one target attribute (`Target`).

**Tasks:**

**1. Data Loading and Preprocessing:**

   - Load the dataset.

   - Check for missing values and handle them if necessary.

   - Split the data into training and testing sets (80% training, 20% testing).

**2. Model Design:**

   - Design and implement the following regression models using the training data:

      - Linear Regression

      - Polynomial Regression (Degree 2)

      - Stepwise Regression (Implement a basic version using forward selection)

      - Ridge Regression

      - Lasso Regression

      - ElasticNet Regression

**3. Model Evaluation:**

   - Evaluate each model on the test data.

   - Display the following performance metrics for each model:

      - Mean Absolute Error (MAE)

      - Mean Squared Error (MSE)

      - R-squared (R²)

   - Plot the predicted vs actual values for each model.

**4. Comparison:**

   - Summarize the performance of all models in a comparison table.

   - Discuss which model performed best based on the evaluation metrics and explain why.

**5. Visualization:**

   - Create visualizations comparing the performance of the different models.

   - Plot the coefficients (if applicable) for the different models to compare how each model handles the feature importance.

**Expected Output:**

- Code implementation with detailed comments.

- Performance metrics and visualizations for each model.

- A final comparison table summarizing the performance of all models.

- Insights based on the comparison of models.


**Note:** Utilize libraries such as `pandas`, `numpy`, `scikit-learn`, `matplotlib`, and `seaborn` for data handling, modeling, and visualization.


This lab exercise will help you understand the nuances of different regression techniques and how to evaluate and compare their performance effectively.


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