 

**Project Title: Concrete Strength Prediction**

**1. Dataset Overview:**

- Download the dataset.

- Specify the target variable: `strength` (compressive strength of the concrete). **2. Data Preprocessing:**

- Handle missing values, outliers, and any data anomalies.

- Explore the distribution of the target variable and features. - Standardize or normalize numerical features if necessary.

**3. Model Selection:**

- Choose at least three regression models for concrete strength prediction. Suggested models include:

- Linear Regression

- Random Forest Regressor

- Gradient Boosting Regressor (e.g., XGBoost)

**4. Model Training:**

- Split the dataset into training and testing sets.

- Train each selected model on the training dataset.

**5. Evaluation Metrics:**

- Evaluate the performance of each model on the testing set using regression metrics:

- Mean Absolute Error (MAE)

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- Mean Squared Error (MSE)

- Root Mean Squared Error (RMSE)

- R-squared (R2) score

**6. Feature Importance:**

- If applicable (e.g., for Random Forest or Gradient Boosting models), analyze and interpret feature importance for insights into what influences concrete strength the most.

**7. Hyperparameter Tuning:**

- Conduct hyperparameter tuning for one or more selected models using techniques like Grid Search or Random Search.

- Explain the chosen hyperparameters and the reasoning behind them. **8. Comparative Analysis:**

- Compare the performance of different models based on the evaluation metrics.

- Discuss the strengths and limitations of each model in the context of concrete strength prediction.

**9. Conclusion:**

- Summarize the findings of the project.

- Discuss any challenges faced during the regression modeling process.

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