

Midpoint Report (Week 8) - Concrete-Strength-G1

Dataset: Concrete Compressive Strength (1,030 samples, 8 features)

Split: 70% train / 15% val / 15% test (random_state=42)

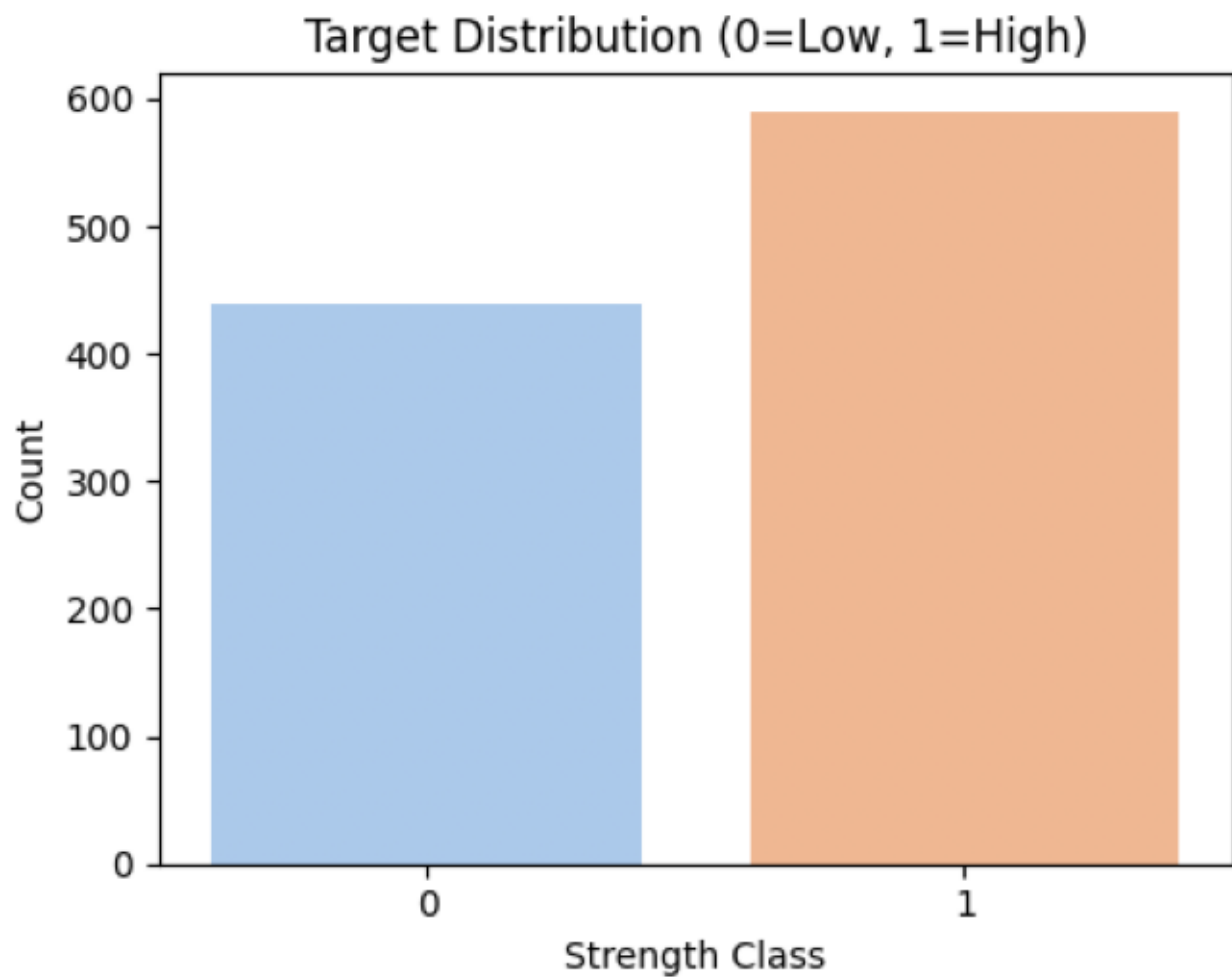
Baselines: Classification - LogisticRegression, GaussianNB; Regression - LinearRegression, Decision

MLflow experiment: ConcreteStrength_Baselines

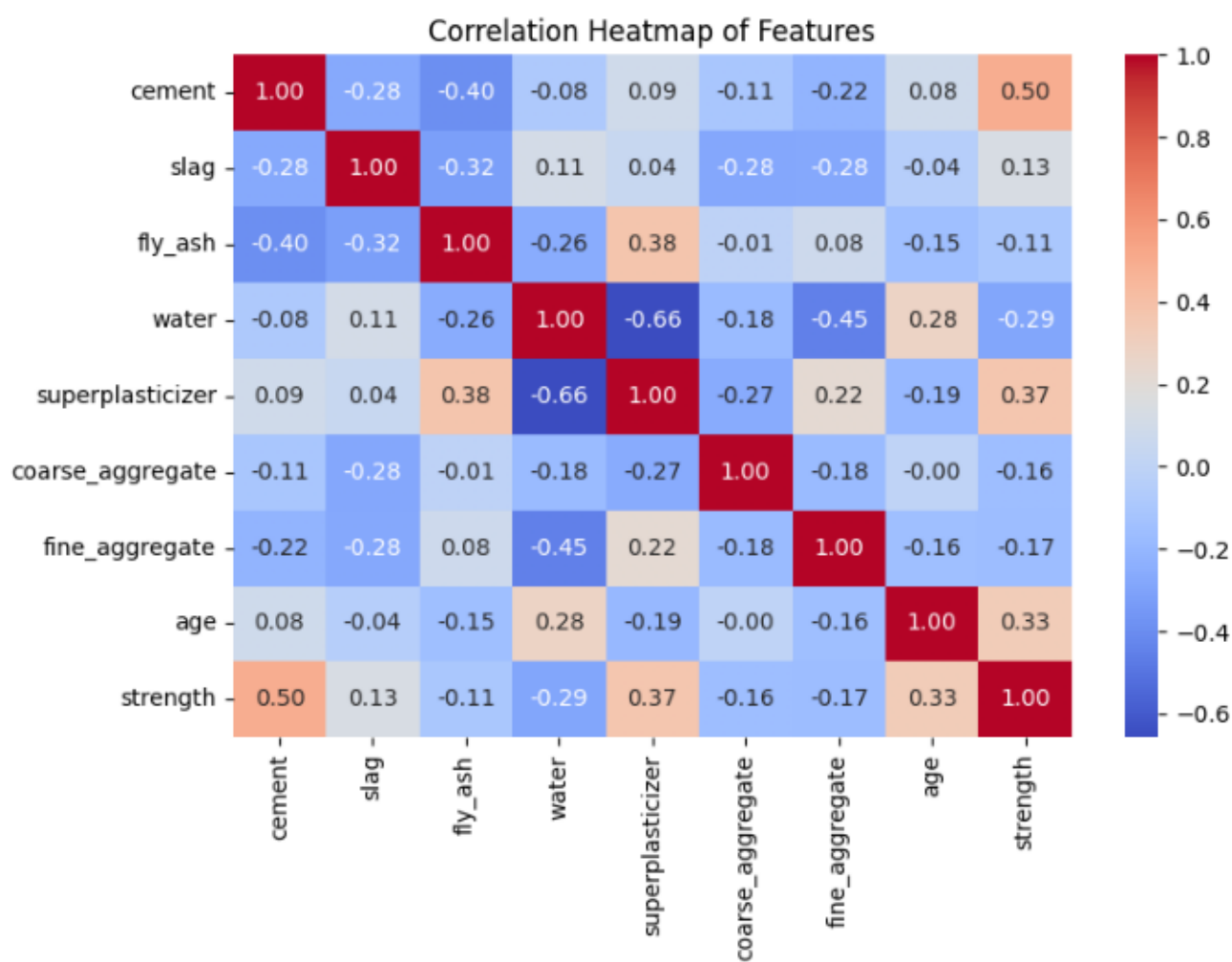
Required Figures:

- 1) Target distribution
- 2) Correlation heatmap
- 3) Confusion matrix (best clf)
- 4) Residuals vs Predicted (best reg)

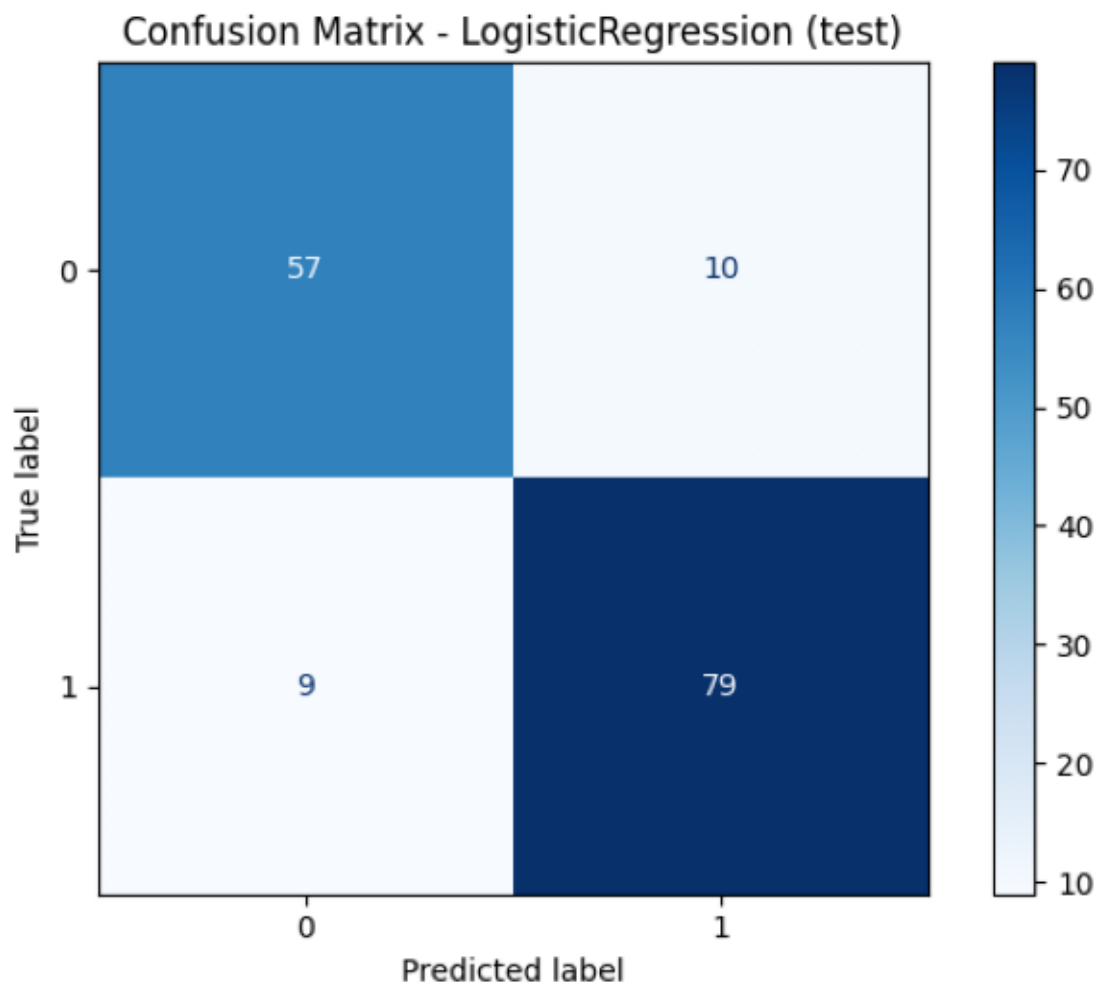
Plot 1: Target distribution



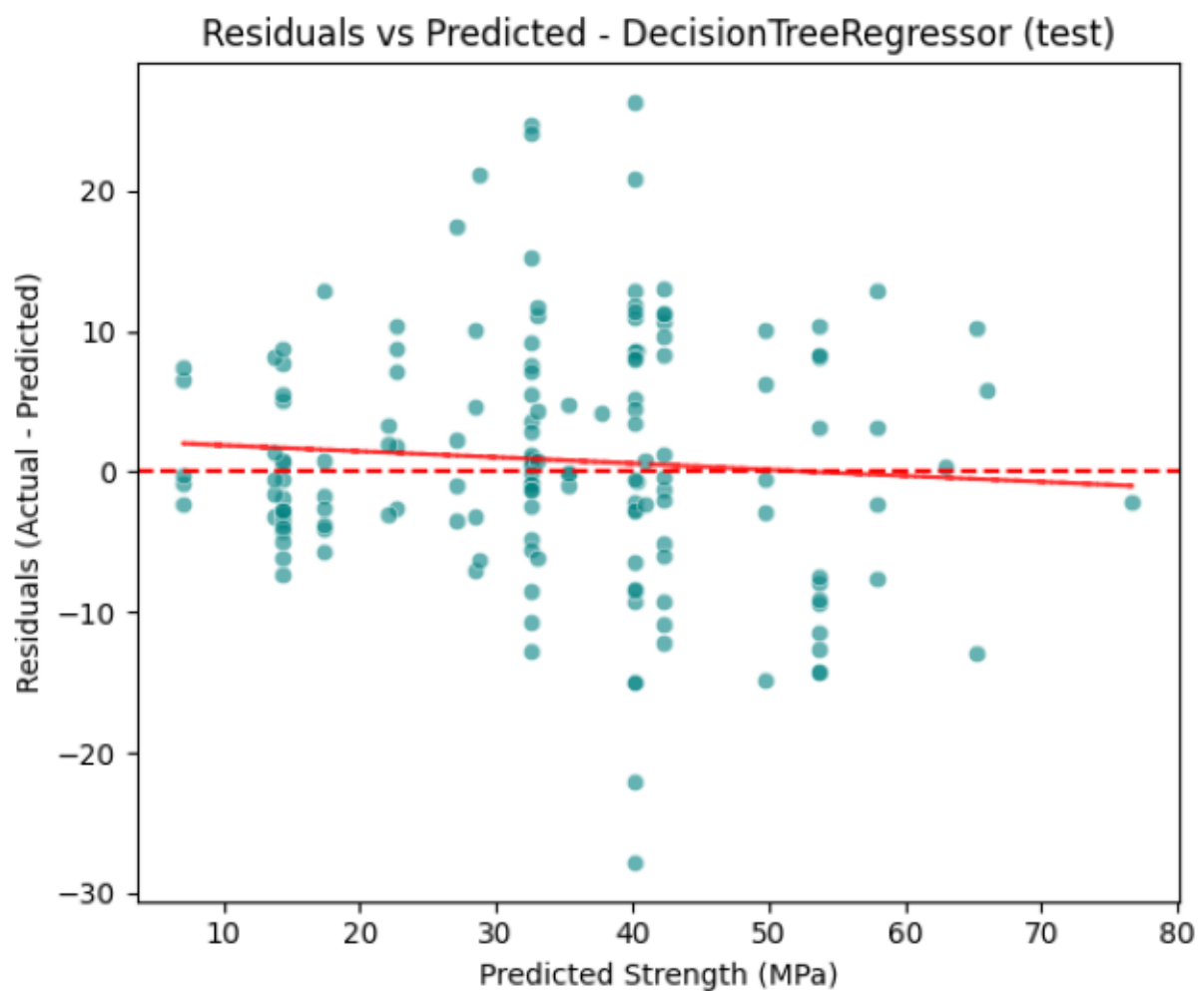
Plot 2: Correlation heatmap



Plot 3: Confusion matrix (best classification)



Plot 4: Residuals vs Predicted (best regression)



Tables: Metrics for baselines

Table 2: Regression metrics (val & test)

model	val mae	val rmse	test mae	test rmse
LinearRegression	9.4086	11.8455	7.7692	9.8132
DecisionTreeRegressor	6.2868	8.6672	6.1297	7.8568

Results and discussion:

The classification baselines show comparable performance; best classifier by validation F1 is: LogisticRegression

The regression baselines report RMSE and MAE; best regression by validation RMSE is: DecisionTreeRegressor

Failure modes: some large residuals remain (outliers), linear models underfit non-linear patterns. Next steps:

Neural network plan: MLP with 2-3 dense layers, ReLU activations, dropout, Adam optimizer.