

Lasso Regression

Test name: Lasso Regression

Dataset: D:/DATA ANALYSIS/H Regression Tests and Models/Lasso Regression/dataset.csv

Rows in original dataset: 649

Columns in original dataset: 33

Rows used in Lasso model: 649

Outcome variable: G3

Numeric predictors: G1, G2, studytime, failures, absences, age, Medu, Fedu

Categorical predictors: school, sex, address, famsize

Encoded predictor columns: 12

Cross-validation folds: 5

Selected lambda.min: 0.054286

Selected lambda.1se: 0.461293

Selected non-zero predictors at lambda.min: 8

Lasso RMSE: 1.247

Lasso R-squared: 0.8508

Interpretation: Lasso uses L1 regularization; coefficients equal to zero are removed from the selected model.

Decision guide: lambda.min gives minimum CV error; lambda.1se gives a simpler model within one standard error.

Reporting guide: state outcome, predictors, standardization, selected lambda, retained predictors, RMSE, MAE, R-squared, and coefficient signs.

Charts generated: 7

Lasso selected coefficients

term	lasso_coefficient	absolute_coefficient	selected_by_lasso	rank_by_absolute_coefficient
G2	0.877894709	0.877894709	Selected	1
failures	-0.145345593	0.145345593	Selected	2
G1	0.125334867	0.125334867	Selected	3
schoolMS	-0.122468506	0.122468506	Selected	4
sexM	-0.114707706	0.114707706	Selected	5
addressU	0.022049898	0.022049898	Selected	6
studytime	0.021098047	0.021098047	Selected	7
absences	0.005108288	0.005108288	Selected	8
age	0.000000000	0.000000000	Shrunk to zero	9
Medu	0.000000000	0.000000000	Shrunk to zero	10
Fedu	0.000000000	0.000000000	Shrunk to zero	11
famsizeLE3	0.000000000	0.000000000	Shrunk to zero	12

Model performance metrics

model	split	n	rmse	mae	r_squared	selected_predictors	lambda
Lasso lambda.min	All data	649	1.246956	0.7757197	0.8507925	8	0.05428552
Lasso lambda.1se	All data	649	1.347221	0.8117588	0.8258329	2	0.46129309
OLS comparison	All data	649	1.239885	0.7787451	0.8524799	12	NA

Cross-validation path

lambda	mean_cv_mse	se_cv_mse	lambda_min	lambda_1se
2.965226	10.328875	0.8634276	0.05428552	0.4612931
2.701803	8.980459	0.8607861	0.05428552	0.4612931
2.461783	7.734593	0.7838998	0.05428552	0.4612931
2.243085	6.700231	0.7174024	0.05428552	0.4612931
2.043815	5.841467	0.6597825	0.05428552	0.4612931
1.862248	5.128488	0.6097613	0.05428552	0.4612931
1.696811	4.536545	0.5662553	0.05428552	0.4612931
1.546071	4.045089	0.5283449	0.05428552	0.4612931
1.408722	3.637060	0.4952487	0.05428552	0.4612931
1.283575	3.298295	0.4663016	0.05428552	0.4612931
1.169546	3.017036	0.4409365	0.05428552	0.4612931
1.065647	2.783857	0.4185684	0.05428552	0.4612931













