

Bayesian Regression

Test name: Bayesian Regression

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

Rows in original dataset: 649

Columns in original dataset: 33

Rows used in Bayesian regression model: 649

Outcome variable: G3

Numeric predictors standardized: G1, G2, studytime, failures, absences, age

Categorical predictors dummy-coded: school, sex, address

Formula: $G3 \sim z_G1 + z_G2 + z_studytime + z_failures + z_absences + z_age + school + sex + address$

Likelihood: Normal outcome model with identity link.

Prior: $\beta \mid \sigma^2 \sim \text{Normal}(0, \sigma^2 V_0)$; $\sigma^2 \sim \text{Inverse-Gamma}(a_0, b_0)$.

Prior variance: intercept=1000, slopes=100; $a_0=2$, $b_0=2$.

Posterior draws generated: 6000

Posterior σ^2 mean: 1.5412

Bayesian R-squared mean: 0.8526

Bayesian R-squared 95% credible interval: 0.8365 to 0.8677

Predictor credible effects excluding intercept: 3

Decision guide: a coefficient is treated as a credible effect when its 95% credible interval does not cross zero.

Reporting guide: report posterior mean, posterior SD, 95% credible interval, probability of direction, Bayesian R-squared, and posterior predictive check.

Charts generated: 8

Bayesian coefficient posterior summary

term	posterior_mean	posterior_sd	ci95_lower
(Intercept)	11.97956613	0.11982084	11.74769090
z_G1	0.36396453	0.09930646	0.17332508
z_G2	2.56375704	0.09762700	2.37290688
z_studytime	0.05092287	0.05149657	-0.05068141
z_failures	-0.13428355	0.05556552	-0.24043052
z_absences	0.08292208	0.05134674	-0.01909975
z_age	0.02939946	0.05302900	-0.07686181
schoolMS	-0.16851641	0.11628713	-0.39657745
sexM	-0.20381373	0.10311077	-0.40788407
addressU	0.09852254	0.11325954	-0.12306777
posterior_median	ci95_upper	probability_positive	
11.97908399	12.216447119	1.000000000	
0.36225107	0.556789879	1.000000000	
2.56420395	2.751141425	1.000000000	
0.05120888	0.150773133	0.838000000	
-0.13468813	-0.024571376	0.009833333	
0.08317184	0.183031693	0.944333333	
0.02920914	0.132883992	0.716166667	
-0.16804976	0.058487395	0.074666667	
-0.20225237	0.001001501	0.025500000	
0.09917655	0.319719563	0.806000000	
probability_negative	probability_direction		
0.00000000	1.0000000		
0.00000000	1.0000000		
0.00000000	1.0000000		
0.16200000	0.8380000		
0.99016667	0.9901667		
0.05566667	0.9443333		
0.28383333	0.7161667		

Bayesian regression fit statistics

model outcome		n
Conjugate Bayesian normal linear regression		G3 649
p_parameters_including_intercept posterior_draws		
	10	6000
prior_intercept_variance	prior_slope_variance	prior_a0_sigma2
1000	100	2
prior_b0_sigma2	posterior_a_sigma2	posterior_b_sigma2
2	326.5	501.8358
posterior_sigma2_mean	posterior_sigma2_median	bayesian_r2_mean
1.541161	1.538272	0.8526299
bayesian_r2_ci95_lower	bayesian_r2_ci95_upper	
0.8364601	0.8676661	
rmse_using_posterior_mean_fit	mae_using_posterior_mean_fit	
1.240969	0.7800183	
waic_gaussian_approximation		
2155.479		















