PS8_Zilles

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March 2024

5. How does your estimate compare with the true value of β in (1)?

	(beta_ols_closed)
X1	1.501 051 8
X2	−1.000 829 6
X3	−0.251 648 0
X4	0.749 040 6
X5	3.500 553 1
X6	−2.000 818 5
X7	0.498 714 8
X8	1.002 826 9
X9	1.246 510 2
X10	2.001 001 2

These are all very close. If I were to round to two decimal places they would all be right on. It looks like the farthest one away is off by .0035ish.

7. Do your answers differ?

	(beta_ols_lbfgs)	(beta_ols_neldermead)
X1	1.501 051 8	1.177 068 4
X2	−1.000 829 6	−0.916 466 1
X3	−0.251 648 0	−0.160 191 4
X4	0.749 040 6	0.999 024 8
X5	3.500 553 1	3.074 031 5
X6	−2.000 818 5	−2.265 898 1
X7	0.498 714 8	0.596 148 5
X8	1.002 826 8	0.845 413 0
X9	1.246 510 2	1.441 592 5
X10	2.001 001 2	2.033 194 1

Yeah, quite a bit actually. L-BFGS is a virtual match with OLS closed-form solution. Nelder-Mead is quite a bit off though. Some estimates are off by around 0.5.

9. Tell me about how similar your estimates of $\hat{\beta}$ are to the "ground truth" β that you used to create the data in (1)

	(simple lm())
X1	1.501
	(0.002)
X2	−1.001
	(0.002)
X3	−0.252
	(0.002)
X4	0.749
	(0.002)
X5	3.501
	(0.002)
X6	−2.001
	(0.002)
X7	0.499
	(0.002)
X8	1.003
	(0.002)
X9	1.247
	(0.002)
X10	2.001
	(0.002)
Num.Obs.	100 000
R2	0.991
R2 Adj.	0.991
AIC	145 143.6
BIC	145 248.3
Log.Lik.	−72 560.811
RMSE	0.50

Again, these are all really close and within 0.003 of the "ground truth". Most are within 0.001. They seem to be a match with the closed-form OLS estimate used in (5) above.