

Lab - Day 1

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General

Pick a context of your liking, and experiment on whether MCMC applied to parameters alone (“collapsed”) and MCMC applied to parameters and latents jointly (“augmented”) give you the same answer.

A very simple sandbox on this could be something like $Y_i|L_i \sim N(L_i, 1)$, for $i = 1, \dots, k$, along with $L_i \sim N(\mu, \sigma^2)$.

As a follow-up, do you have any thoughts on what might be done if the MCMC implementation is collapsed, but posterior inference about a latent variable is desired?

Segment 2C

Recall the Segment 2C context of fitting a model allowing modest departures from the missing-at-random (MAR) assumption. Experiment with the impact of sample size on inference about regression parameters describing the $(Y|X)$ relationship. Does what you find match with how sample size affects inference in “typical” statistical problems?

Segment 3A

In the context of Segment 3A, consider relaxing the nondifferential assumption, i.e., allow that the lab test performance might depend on the health outcome.

Does the inference about the target parameter change?

Try visualizing any such change with a posterior scatterplot of the target parameter versus the difference between the two test sensitivities.

Segment 3B

Simulate some data in the format considered in Segment 3B, but in the special case that X and Y are actually independent of one another. How well does inference seem to work in this setting?