Homework 2b

Charles Margossian

The plotted data is obtained by doing a full Bayesian inference on a latent Gaussian model, and corresponds to MCMC samples from the posterior distribution. The latent parameters, θ, follow a multivariate normal distribution. The goal of the plots is to explore the model and data regimes in which a strong posterior correlation (i.e. "strength borrowing") occurs. This correlation is manifested by an elliptical shape which only appears when both the *prior* correlation is high and the sample size is small. Either alone does not incur a strong posterior correlation (figure 1).

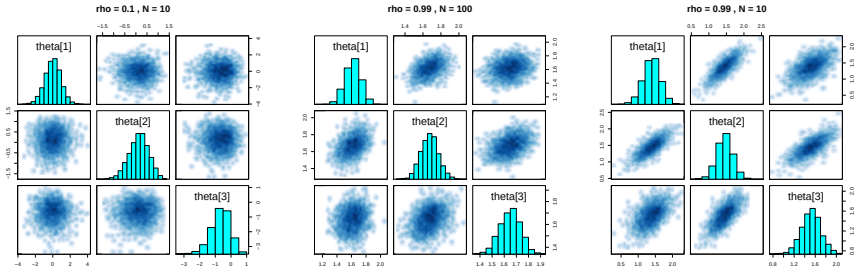

Figure 1: Pairs plots for latent Gaussian model

Figure 1 achieves its goal, but seems misleading, because the scales are very different between pairs plots. In this example, the more information we add, the tighter the posterior distribution becomes. Figure 1 may wrongfully convey that the posterior is tighter when $N = 10$ than when $N = 100$. So, let's rescale, and build figure 2.

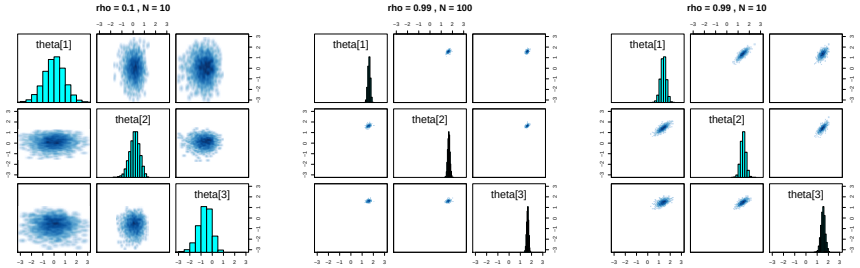

Figure 2: Pairs plots for latent Gaussian model

It is now clear that the more information we add (through the prior or additional data) the tighter the posterior distribution becomes. This information however overwhelms the difference between spherical and elliptical posteriors, and the goal of the plots is no longer achieved. The plots achieve a different goal, and I would likely include them both in a manuscript.