Simulation Journal for the *augSIR* package

July 24, 2015

7/24/2015 - Simulations to assess the effect of population size and binomial sampling probability on mixing

Simulation parameters

- Population size: 50, 100, 150, 200, 300, 400, 500
- R_0: 2, 5, 10
- ρ : 0.05, 0.2, 0.5
- $\beta = \frac{R_0}{\text{population size}}$, $\mu = 1$
- Census interval = 0.2
- Three initializations for each scenario, diffuse priors for model parameters

Measures of interest

- Proportion of proposed trajectories accepted
- Posterior distributions of model parameters
- Complete data log-likelihood

Summary of results

- In small populations (50-200ish) the mcmc mixed well and all three initializations settled around roughly the same log-likelihood. The parameters were better recovered in smaller populations.
- In larger populations, the chains mixed poorly and were stuck in different modes of the likelihood.

Next steps and other notes

- It was thought that the priors, while perhaps appropriate for each parameter separately, could jointly pull the value of R_0 away from the true value. Will explore reparameterizing the model in terms of R_0 and sampling parameters using M-H.
- Will run simulations to determine if problems persist with parameters fixed at the true values.
- Will include posterior samples of R_0 in future simulations.