STAT 532 Project Description

Presentations: December 2-4 (also finals week?)

Written report: THURSDAY, December 3 by 3:00 p.m.

The focus of this project is thoroughly investigating a particular Bayesian model and analysis used to solve a real problem and reported on in a peer-reviewed journal article. Your chosen article will also be involved in some homework assignments, but this document describes the formal class project which has a written and oral component. For your chosen journal article, you should do and report the following:

1. Provide a description of the study design, data collection procedures, and main question of interest.

2. Understand the model and explicitly write it out in a way that makes sense to you (*i.e.* it can differ from how it is written in the paper).

3. Simulate data under the assumed model. Choose parameter values consistent with what is reported in the results of the paper. Provide meaningful plots of the data and describe the steps you used to simulate the data and any problems you encountered.

4. Fit the Bayesian model first under the assumptions the authors of the paper use. Comment on any problems or confusions with fitting their model. Did they provide enough detail that you could easily do it? How does convergence look, etc.?

5. Now, make any changes you think need to be made to improve convergence or solve any other problems with specification or implementation of the model.

6. Define and implement at least one appropriate posterior predictive check. I realize you may not be able to fully implement it if you do not have the observed data, but go ahead and implement it using simulated data (you can simulate data from a different model and then use the check to make it more interesting).

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You will turn in a written report and give a presentation to the class:

I. Write up your **report** with the following sections:

   (a) Introduction
   (b) Model
   (c) Model implementation (simulation and model fitting)
   (d) Posterior predictive checks
   (e) Your opinion of the data analysis and what you learned

II. Create a **presentation** geared toward your fellow students with an overview or interesting parts of your written report. Focus on things you struggled with and learned in hopes of passing some of the knowledge you gained along to your fellow students. You can make slides or a handout. Your presentation should not be more than 15 minutes so that we have some time for discussion as well.