ST440/540 – Mid-term take-home exam – Due 4/17

THIS IS AN EXAM - DO NOT DISCUSS THE PROBLEM WITH ANYONE (INCLUDING OTHER STUDENTS OR THE TA)! If you have questions please visit office hours or email me.

The data consist of (synthetic) meteorological data from the past 50 years. The response each year is the number of tropical storms that make landfall on US Atlantic Coast. The predictors are the sea surface temperatures (SST) from the six months prior to the beginning of the hurricane season. The SST data are available at ten locations. Your goal is to identify the months and locations of SST that are the most predictive of the number of storms, and build a predictive model for the number of storms based on data available at the beginning of the hurricane season.

The R workspace on the website consists of the objects Y, X and S:

- Y[t] is the number of storms in year t

- X[m,l,t] is the standardized SST for month m, location l and year t

- S[l,] is the (longitude, latitude) of SST measurement location l

Summarize your analysis in a 2-4 page report (double spaced, 11pt, one-inch margins). Papers longer than four pages will be penalized. To avoid penalty, your report MUST have the follow sections and contents:

1. Introduction: Briefly describe the problem and your objectives

2. Methods: Describe the Bayesian model(s) you propose and other relevant details

3. Computation: Give the details of the algorithms you use and the verify the algorithms were successful

4. Model comparisons: Fit 2-3 models to the data and select a best fitting model

5. Results: Discuss which locations and times are most predictive of the number of hurricanes

6. Prediction: Forecast (with uncertainty measures) the number of storms in the final year of the data set.

Your paper should be written as a professional document will full paragraphs, clearly labeled and numbered figures and/or tables, and few spelling/grammar errors. You should include enough detail that another student in class could reproduce your results. You do not need to turn in all of your code, but please include commented JAGS code for your final model (this does not count towards the four pages limit).

Non-DE students should turn the exam at the beginning of class on the 17th. DE students should email the exam to the instructor (bjreich@ncsu.edu) by midnight on the 17th.

Have fun!