Problem Set 13 Notes

Stat 341 – Spring 2017

General comment

As we get more and more familiar with creating models and extracting information from them in R, the emphasis should be turning toward what this output tells you, not just getting R to spit out a bunch of stuff that you make no comment about. "Compare these models" does not mean use `compare()` and move on without discussion, for example. Tell me what the output of `compare()` (or whatever other things you do to compare the models) indicates.

10M1

I have a problem for you to look at in class that I hope will help clarify the issues with the likelihood function using aggregated vs. disaggregated data for a binomial model.

10M3

1. The logit transformation goes from $(0, 1)$ to $(-\infty, \infty)$, not the other way around. (The logistic function goes the other way.) In either case, in answering this question you should address both the $(0, 1)$ – the probability scale – and the $(-\infty, \infty)$ – the linear model scale.

2. You should know the formala for the logit function as well as how to use `logit()`.

10H1

1. Most of you pointed out that the MAP and Stan fits differ the most for parameter `a[2]`. Most of you noted that the posterior distribution for `a[2]` (as fit by Stan) is skewed (so MAP won't be able to fit it well, since MAP presumes all posteriors are normal, hence symmetric). But most of you didn't discuss why `a[2]` is different from the others. What makes `a[2]` special? Take another look.

2. Some of you didn't notice that `a[2]` has the most skewed of the posterior distribution. You could notice this a number of different ways, including simply plotting the posterior distributions, or using `pairs()`. You can also combine `plot()` and `coeftab()` to get nice visual comparison of the estimates for each parameter.

10H2

1. Most of you used `compare()` to compare the models, but then said nothing about the output. I went easy on you for this, but the intent was not that you simply dump the output of `compare()` but that you use that output to say something.

2. If you mix Stan and MAP models in `compare()`, you will get a stern warning. If you use Stan for any of the models in the comparision, you should use Stan for all.

3. If `rhat` is not 1, the first thing to try is a larger value of `iter` (perhaps also setting `warmup`) so that you get more posterior sampling. If that doesn't reduce `rhat`, then there may be other issues. If it does, you may simply need to give the sampler more time to converge to the posterior distribution.

10H3: The Eagles

1. The biggest issues here were that some of you didn't do all of the things asked for. Commonly ommitted items:

   a. interpretating the parameters in part b.

   b. discussion of results in part c.

2. Skewed posterior distributions from Stan are one indicator that `map()` might not suffice. To be fair, one should also look for signs of problems with the Stan fit. `rhat`, effective number of parameters, and the behavior of chains are good things to inspect on that side of things. In this example, you should use Stan rather than `map()` since there is clearly some skew in a couple of the posterior distributions.

3. I went easy on the plots in part b because I decided that the question wasn't worded as clearly as it might have been. Note that for this model, `link()` returns proportions but `sim()` returns counts. So the author really wanted you to compare the results of `link()` and `sim()`, not to simply multiply the proportions from `link()` by `n` to get counts.

4. Adding the raw data to the plots makes them much more informative ragarding model fit.

5. Once you notice that WAIC things the interaction model is better, you should check to see what the model things about that interaction.