To Do List

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- Read intros to listed texts (See Thesis section 2.1 Why Predictive Inference?) and summarize answers to that question in WhyPredictiveInference.Rnw

    - Nate Silver's book (1st chapter or intro)
    - ~~Hoff's book~~
    - Geyser's book (1st chapter or intro)
    - Aitchison and Dunsmore (1st chapter or intro)
    - ~~Dean's paper~~
    - maybe some googling

- ~~Create example comparing predictive inference result with plug in parameter result~~

    ~~Dean's suggestion: 1-sample binomial with small sample size. E.g. 3 successes, 7 failures (Pr(success) < 0.5). Difference will be more pronounced with smaller sample sizes.~~

- (1) Combine rpredNormIG(), rpredNormIG2(), and rpredNormIGk() into one function

- Read up on convergence in probability and justification for MCMC (Hoff, Casella & Berger)

- Compare variance computations: var() function on MCMC sample vs direct computation from theory ($EX^2 - (EX)^2$)

- (2) General guidance: Read up on "How to write a thesis in Latex," for example https://www.overleaf.com/learn/latex/How_to_Write_a_Thesis_in_LaTeX_(Part_1)%3A_Basic_Structure

- (3) Figure formatting: save figures as .png files and insert? Or what? Need better control over how figure appears in resulting pdf.

- (0) Incorporate any guidance from Dean.

- Write up explanation of how each function works

- Exponential-Gamma random sampler: draw a single theta from posterior or draw a new one for each prediction? (Can't tell the difference from histograms)

- Beta-Binomial: Use posterior of theta (which is a gamma) and then make prediction based on draw(s) of theta (like I'm doing for Exponential-Gamma?) Why did I go to the trouble of using the inverse transform method before?

- Work through the math for the 2-sample Normal-Inverse Gamma full conditional distributions (see Hoff p. 128)

- Beta-binomial: try drawing $\theta \sim \text{Beta}(t + \alpha, N - t + \beta)$ and then predict t using `rbinom(S,N,theta)`.

- Review use of $\pi(\cdot)$ to denote prior distributions of parameters. Right now my intro says I'm doing that but at least ing the k-sample Normal-Inverse Gamma I'm not doing that.

Dean's Notes 1/4/2022

1. ~~Remove the "Chapter 1" and "Chapter 2" from the chapter titles.~~

2. question sent back to Dean 1/5
   p 4, Abstract - You know that Bayesian inference need not be predictive.

3. p 4, section 2.1
   I think you may need a citation for that first sentence.
   I feel like you need several citation in this first paragraph.
   How many of these assertions are your original ideas, and how many are borrowed?

4. sent update to Dean 1/5/2022 p 5 What are the take-aways from this example?

5. p 8 Ch3 intro paragraph
   Yes - add an intro paragraph
   What about these problems makes them unique? or simple?
   Also, describe (list) the problems you are going to address.

6. p9, bottom - The random sampling should work the same either way. Is one method preferable?

7. p10, bottom
   The likelihood is a function of the parameter conditional on the data.

   Ok is the point that we're talking about a posterior distribution of θ? This is the only place in the paper that I talk in terms of Likelihood, and the only reason I do it is that Geisser made the switch here.

   The conventional use of upper and lower case values for variables you know that Y is unobserved, y is observed.

Switching to the likelihood notation is a little less cumbersome.
For discrete PMFs (like the binomial), the expression would be
$\Pr(Y1 = y1, ..., Yn = yn|\theta)$

For continuous pdfs its trickier.

You can use whichever notation you like - but you have to define it if it's unusual.
It needs to be clear what you are conditioning on, and what is unknown (or random)

By "whichever notation" do you mean choosing between $p(\theta|data)$ and $L(\theta)$? Also, if I go with likelihood, do I need to say $L(\theta|data)$ or is there no need because "given the data" is understood by definition of likelihood?

8. ~~p 11 - first para. For the sentences above, I presume you want some censoring value and not a parameter theta?~~

9. p17 - section 3.3.3 I also don't know where you got this example. Discuss over Zoom

10. ~~p21 3.4.1.3 - I don't think you need other values for kappa or nu.~~

11. ~~p24. 3.4.2.3 - I would probably just say that Hoff provides the following example and we reproduce his description.~~

12. ~~p27. The two-column format would be more standard, and would fit better with the "tidy" data format. It would be easier to use.~~

13. p 33. "Comparing the values of ß^ols to their standard errors:"
This is the usual regression t-statistic for regression parameter estimates.

14. This is as far as I got.
dean

Questions for Dean 1/28/2022

1. NormIG2(): Subscript N in the parameters $\mu_N, \gamma_N^2, \delta_N, \tau_N^2$. Interpret these as $N = N_1 + N_2$?