STAT548 Ph.D. Qualifying Course Papers

I'm generally interested in large-scale, complex, and streaming data, with theoretically rigorous analysis and computation as primary goals. In particular, my research usually falls at the intersection of Bayesian (sometimes nonparametric) modelling, statistical theory, and computation. I'd also be happy to discuss any other paper you find interesting that you think might fall in my area of expertise.

Task: Write a description of the main ideas, making sure to include a summary of the problem the paper addresses, the context, and the proposed solution, as well as a critical analysis of the paper and its results. Suggest directions for future research. Papers listed below may have multiple contribution areas (theory, modelling, computation), and the contents of your report should reflect that. For example, you should implement any applied concepts in a scenario different to that presented in the paper, and provide critical analysis of the result. For any important theoretical concepts, you should provide a summary of the result, its importance, and its proof in your own words along with validation via simulation where appropriate. If you're not sure about the requirements for any of the papers below, feel free to ask me in person. Any coding tasks should preferably be done in python / numpy – talk to me about other languages.

1. Bouchard-Côté, Vollmer, & Doucet. "The Bouncy Particle Sampler: A Non-Reversible Rejection-Free Markov Chain Monte Carlo Method," Journal of the American Statistical Association 113(522), 2018.

   Summary: Scalable piecewise-deterministic MCMC

   URL: https://arxiv.org/pdf/1510.02451.pdf

2. Ranganath, Gerrish, & Blei. "Black box variational inference," AISTATS 2014.

   Summary: Automated Bayesian stochastic variational inference for general variational families

   URL: https://arxiv.org/abs/1401.0118

3. Liu, Lee, & Jordan. "A kernelized Stein discrepancy for goodness-of-fit tests," ICML 2016.

   Summary: A general technique for bounding distances between distributions—useful for Bayesian posterior error quantification

   URL: https://arxiv.org/pdf/1602.03253.pdf

4. Miller. "A detailed treatment of Doob's theorem," arXiv:1801.03122

   Summary: A clear treatment of a really beautiful Bayesian result, Doob's consistency theorem

   URL: https://arxiv.org/pdf/1801.03122.pdf