6.882 Project Pre-Proposal: Comparing Speedups to MCMC-MH

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1   Overview

For the past several decades, Markov Chain Monte Carlo (MCMC) methods have been used to sample from nonstandard posterior distributions in Bayesian statistics. However, when dealing with a large data set, MCMC methods tend to scale rather poorly. Much of the computational complexity of the Metropolis-Hastings (MH) algorithm comes from the need to make a full pass over the observed data at each iteration. As such, there have been a multitude of papers that propose various techniques to improve this performance. Interestingly, while many of these papers have compared their algorithms to earlier speedups, they have all done so on an entirely new model. Thus, for our project, we propose to compare the "delayed acceptance" speedup of Quiroz et al. (2017) [2] to the data subsampling method of Korattikara, Chen, and Welling (2013) [1] on the original MNIST random walk proposal of the Korattikara paper.

As a secondary note, we are still unsure of the exact techniques that we would like to replicate; we will finalize this by our proposal next week.

References

[1]   Anoop Korattikara Balan, Yutian Chen, and Max Welling. "Austerity in MCMC Land: Cutting the Metropolis-Hastings Budget". In: *CoRR* abs/1304.5299 (2013). arXiv: 1304.5299. URL: http://arxiv.org/abs/1304.5299.

[2]   Matias Quiroz et al. "Speeding up MCMC by Delayed Acceptance and Data Subsampling". In: *Journal of Computational and Graphical Statistics* 0.0 (2017), pp. 1–11. DOI: 10.1080/10618600.2017.1307117. eprint: https://doi.org/10.1080/10618600.2017.1307117. URL: https://doi.org/10.1080/10618600.2017.1307117.