Runjing (Bryan) Liu

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Education

UC Berkeley; Berkeley, CA — *August 2016 to present*
PhD student, Statistics

Duke University; Durham, NC — *August 2012 to May 2016*
Major: Mathematics (BS), Minor: Biology
GPA: 3.99/4.00
Summa cum laude
Graduation with high distinction

Awards and Fellowships:

NSF graduate research fellow 2017
Julia Dale Prize in mathematics 2016
Barry Goldwater Scholarship Honorable Mention 2015
Phi Beta Kappa Academic Honor Society

Current Research:

I am a PhD student advised by Prof. Jon McAuliffe. I am interested in **approximate Bayesian inference** and am currently working on **variational methods**. Some projects include:

1. **Applications in astronomy:** I train deep generative models for the detection of dark matter in telescope images. I draw ideas from Bayesian probabilistic modeling and incorporate physical models from astronomy. My goal is to develop a fully unsupervised inference procedure for dark matter detection in large-scale astronomical surveys.
2. **Methods in Bayesian robustness:** Leveraging modern auto-differentiation tools, I am developing an efficient, automatic procedure to evaluate the sensitivity of posterior inferences to model assumptions, under the variational inference framework.
3. **Applications in genomics:** I work on the Berkeley Drosophila Genome project. I helped write an open-source Python package for *iterative Random Forest,* an extension of random forest developed for genomic data to detect stable high-order interactions that drive gene expressions.

Publications and pre-prints:

Liu R., Regier J., Tripuraneni N., Jordan M. I., McAuliffe J. "Rao-Blackwellized Stochastic Gradients for Discrete Distributions." *International Conference on Machine Learning.* June 2019. https://arxiv.org/pdf/1810.04777.pdf.

Giordano R., Stephenson W., **Liu R.,** Jordan M. I., Broderick T. "Return of the Infinitesimal Jackknife." *Conference on Artificial Intelligence and Statistics.* April 2019. https://arxiv.org/pdf/1806.00550.pdf.
-- selected for Notable Paper Award and oral presentation

Liu R., Giordano R., Jordan M. I., Broderick T. "Evaluating Sensitivity to the Stick Breaking Prior in Bayesian Nonparametrics." *NIPS*, *All of Bayesian Nonparametrics workshop*. December 2018. https://arxiv.org/pdf/1810.06587.pdf.
-- selected for the ISBA@NIPS Award
-- selected for contributed talk.

Giordano R., **Liu, R.**, Varoquaux N., Jordan M. I., Broderick T. “Measuring Cluster Stability for Bayesian Nonparametrics Using the Linear Bootstrap.” *NIPS*, *Advances in Approximate Bayesian Inference Workshop*. December 2017. https://arxiv.org/pdf/1712.01435.pdf.

Liu, R, Layton, A. "Modeling the Effects of Positive and Negative Feedback in Kidney Blood Flow Control." *Mathematical Biosciences*. June 2016: Vol. 276, pp 8-18.

Liu, R., Patel, M., Badal, J. "Encoding whisker deflection velocity within the rodent barrel cortex using phase-delayed inhibition." *Journal of Computational Neuroscience*. December 2014: Vol. 37, Issue 3, pp 387-401.

Work experience:

Data Science Intern at Google Cloud. *Summer 2019.* Worked on demand forecasting for Google data centers, and specifically on the development of general-purpose, validated prediction intervals.

Teaching:

Linear modeling: theory and applications. Graduate student instructor. *Fall 2018*
-- selected as Outstanding Graduate Student Instructor.
Introduction to time series. Graduate student instructor. *Spring 2019*

Skills:

Proficient in Python and R.

Other:

Berkeley **Statistics Graduate Student Association** co-president, *Fall 2018-Spring 2019*
Gave a student talk at the bi-annual **Berkeley Stanford Joint Statistics Colloquium**, *Fall 2017*
Middle school math tutor for **Bridging Berkeley***, Fall 2017*
Chaired workshop for the NSF graduate fellowship application, *Fall 2017*
Co-organizer for **Berkeley Datafest***, Spring 2017, 2018*
TA for **Duke TIP** in a number theory and cryptology course, *Summer 2015 and Summer 2016*