

Ray Bai

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Academic Employment

- 2020- Assistant Professor of Statistics, University of South Carolina
- 2018-2020 Postdoctoral Researcher in Biostatistics and Informatics, University of Pennsylvania
Supervisors: Yong Chen and Mary Boland

Education

- 2014-2018 PhD in Statistics, University of Florida
Advisor: Malay Ghosh
Thesis: Bayesian High-Dimensional Models with Scale-Mixture Shrinkage Priors
- 2014-2016 Master of Statistics, University of Florida
Advisor: Nikolay Bliznyuk
Project: Irrigation Forecasting in Southwest Florida
- 2010-2012 MS in Applied Mathematics, University of Massachusetts Amherst
- 2003-2007 BA in Economics and Government, Cornell University

Grants Funded

National Science Foundation (August 2021-July 2026). RTG: Mathematical Foundation of Data Science at University of South Carolina (DMS-2038080). PI: Linyuan Lu, University of South Carolina. Role: Senior Personnel. Amount awarded to RB: \$10,932.

National Science Foundation (September 2020-August 2021). RII Track 1: Materials Assembly and Design Excellence in South Carolina: MADE in SC (OIA-1655740). PI: Prakash Nagarkatti, University of South Carolina. Role: Senior Personnel. Amount awarded to RB: \$30,000.

Grants Pending

National Institute of Health (July 2022-June 2024). Exploring the Use of Cultural Tailoring to Increase Fruit and Vegetable Intake among Mexican American Adults. PI: Rachel Davis, University of South Carolina. Role: Co-I. Requested award: \$409,750.

University of South Carolina ASPIRE-I, Track 1 grant (Jul 1, 2022 - Sep 30, 2023). Scalable Bayesian survival analysis with informative cluster size. Role: PI. Requested award: \$13,583.

Publications

(† = student advised by RB, § = co-first author)

1. **Bai, R.**[§], Moran, G. E.[§], Antonelli, J. L.[§], Chen, Y., and Boland, M. R. (2022). Spike-and-slab group lassos for grouped regression and sparse generalized additive models. *Journal of the American Statistical Association* (in press).
2. Meeker, J. R., Burris, H. H., **Bai, R.**, Levine, L. D., and Boland, M. R. (2022). Neighborhood deprivation increases the risk of post-induction cesarean delivery. *Journal of the American Medical Informatics Association*, **29**: 329-334.
3. **Bai, R.**, Ročková, V., and George, E. I. (2021). Spike-and-slab meets LASSO: A review of the spike-and-slab LASSO. In Tadesse, M. G. and Vannucci, M. (Eds.), *Handbook of Bayesian Variable Selection*, 81-108. Chapman & Hall/CRC Press.
4. Meeker, J. R., Canelón, S. P., **Bai, R.**, Levine, L. D., and Boland, M. R. (2021). Individual- and neighborhood-level risk factors for severe maternal morbidity. *Obstetrics & Gynecology*, **137**: 847-854.
5. **Bai, R.** and Ghosh, M. (2021). On the beta prime prior for scale parameters in high-dimensional Bayesian regression models. *Statistica Sinica*, **31**: 843-865.
6. Boland, M. R., Liu, J., Balocchi, C., Meeker, J., **Bai, R.**, Mellis, I., Mowery, D. L., and Herman, D. (2021). Association of neighborhood-level factors and COVID-19 infection patterns in Philadelphia using spatial regression. *AMIA Annual Symposium Proceedings*, **2021**: 545-554.
7. **Bai, R.** and Ghosh, M. (2019). Large-scale multiple hypothesis testing with the normal-beta prime prior. *Statistics*, **53**: 1210-1233.
8. **Bai, R.** and Ghosh, M. (2018). High-dimensional multivariate posterior consistency under global-local shrinkage priors. *Journal of Multivariate Analysis*, **167**: 157-170.
9. Duerr, I., Merrill, H. R., Wang, C., **Bai, R.**, Boyer, M. J., Dukes, M. D., and Bliznyuk, N. (2018). Forecasting urban water demand with statistical and machine learning methods using large space-time data. *Environmental Modelling and Software*, **102**: 29-38.

Preprints

10. **Bai, R.**, Lin, L., Boland, M. R., and Chen, Y. (2022+). A robust Bayesian Copas selection model for correcting and quantifying the impact of publication bias. *Under revision*. arXiv:2005.02930.
11. Balocchi, C.[§], **Bai, R.**[§], Liu, J., Canelón, S. P., George, E. I., Chen, Y., and Boland, M. R. (2022+). A Bayesian hierarchical modeling framework for geospatial analysis of adverse pregnancy outcomes. *Under revision*. arXiv:2105.04981.
12. **Bai, R.**, Boland, M. R., and Chen, Y. (2022+). Fast algorithms and theory for high-dimensional Bayesian varying coefficient models. *Under revision*. arXiv:1907.06477.
13. Deshpande, S. K., **Bai, R.**, Balocchi, C., Starling, J. E., and Weiss, J. (2022+). VCBART: Bayesian trees for varying coefficients. arXiv:2003.06416.
14. **Bai, R.**[§], Liu, X.[§], Lin, L., Liu, Y., Kimmel, S. E., Chu, H., and Chen, Y. (2022+). A Bayesian selection model for correcting outcome reporting bias with application to a meta-analysis on heart failure interventions. arXiv:2110.08849.

15. Wang, S.-H., **Bai, R.**, and Huang, H.-H. (2022+). On the proof of posterior contraction for sparse generalized linear models with multivariate responses.
16. **Bai, R.** (2022+). Spike-and-slab group lasso for consistent estimation and variable selection in non-Gaussian generalized additive models. arXiv:2007.07021.

Advising

PhD Students Directed

Zile Zhao, expected 2024

Sijian Fan, expected 2025

Member of Doctoral Committee

Department of Statistics

Zhen Yang, expected 2022

Shan Zhong, expected 2022

Qingyang Liu, expected 2024

Zehao Yu, expected 2024

Other Departments

Anja Zgodic, Department of Epidemiology and Biostatistics, expected 2023

Honors and Awards

Graduate School Fellowship, University of Florida, August 2014-August 2018

Student Paper Competition Award, Section on Bayesian Statistical Science, Joint Statistical Meetings, January 2018

Travel Award, College of Liberal Arts and Sciences, University of Florida, October 2017, April 2018

Anderson Scholars Faculty Honoree, University of Florida, November 2016

Residential First-Year Experience Student Choice Award, University of Massachusetts, March 2011

Teaching

University of South Carolina

Courses Taught

STAT 714: Linear Statistical Models, Fall 2020, Fall 2021

STAT 718: High-Dimensional Data, Spring 2021

STAT 721: Stochastic Processes, Spring 2022

New Courses Developed

STAT 718: High-Dimensional Data

Special topics class covering statistical methodology and algorithms for high-dimensional data

University of Florida

Courses Taught

STA 3024: Introduction to Statistics II, Spring 2016

Courses Served as Teaching Assistant

STAT 2023: Introduction to Statistics I, Fall 2015

Presentations

Invited Seminar Talks and Guest Lectures

1. Seminar, Department of Biostatistics, Virginia Commonwealth University, November 2021
2. Seminar, Department of Statistics, University of South Carolina, October 2021
3. Seminar, Department of Statistics, University of Minnesota, October 2021
4. Seminar, Department of Statistics, University of California, Davis, April 2021
5. Seminar, School of Mathematical and Statistical Sciences, Arizona State University, January 2020
6. Seminar, Department of Statistics, Florida State University, January 2020
7. Seminar, Department of Mathematics & Statistics, San Diego State University, January 2020
8. Seminar, Department of Statistics, University of California, Santa Cruz, January 2020
9. Seminar, Department of Statistics, University of South Carolina, January 2020
10. Guest lecture, Graduate Group in Genomics and Computational Biology, University of Pennsylvania, December 2019
11. Statistics Student Seminar, University of Florida, April 2019
12. Invited talk, Department of Biostatistics, Epidemiology, and Informatics, University of Pennsylvania, March 2018

Invited Conference Talks

1. Invited session, International Conference on Statistical Distributions and Applications 2022, Huntington, WV, October 2022
2. Invited poster session, Joint Statistical Meetings, Washington, DC, August 2022
3. Invited session, 2022 ICSA Applied Statistics Symposium, Gainesville, FL, June 2022
4. Invited session, CFE-CMStatistics 2021, London, UK, December 2021

5. Invited session, Fifth EAC-ISBA Conference: A Satellite Meeting of the 2020 ISBA World Meeting in Celebrating James O Berger's 70th Birthday (virtual), November 2021
6. Invited session, 2021 ICSA Applied Statistics Symposium (virtual), September 2021

Contributed Talks

1. 2021 Joint Statistical Meetings (virtual), August 2021
2. 2021 ISBA World Meeting (virtual), June 2021
3. 2019 Joint Statistical Meetings, Denver, CO, July 2019
4. 2018 Joint Statistical Meetings, Vancouver, BC, Canada, July 2018
5. Statistics Student Seminar, University of Florida, March 2018
6. Statistics Student Seminar, University of Florida, October 2017

Contributed Conference Posters

1. Bayes Comp 2020, Gainesville, FL, January 2020
2. DBEI and CCEB Research Day, University of Pennsylvania, March 2019
3. O-Bayes 2017 Meeting, Austin, TX, December 2017

Departmental Service

University of South Carolina Department of Statistics

- Member of Graduate Committee, 2021-2022
- Member of Hiring Committee, 2021
- Member of PhD Qualification Exam Committee, 2021

University of Florida Department of Statistics

- Organizer of Statistics Student Seminar Series, 2016-2017

University Service

- Member, Top Scholar Selection Committee, 2021-2022

Professional Service

Editorial Activities

- Grant reviewer for the National Science Foundation in 2020, 2021
- Judge for SBSS Student Paper Competition, 2020

Journal reviewer for 27 papers: *The American Statistician* (1), *Annals of the Brazilian Academy of Sciences* (1), *Bayesian Analysis* (1), *Bernoulli* (1), *Computational Statistics & Data Analysis* (1), *IEEE Transactions on Information Theory* (1), *Journal of Statistical Planning and Inference* (2), *Journal of the American Statistical Association* (4), *Journal of the Royal Statistical Society: Series B* (1), *Lifetime Data Analysis* (1), *Metrika* (1), *The R Journal* (1), *Research Synthesis Methods* (1), *Scandinavian Journal of Statistics* (1), *Science China Mathematics* (1), *Statistica Sinica* (1), *Statistics and Computing* (1), *Statistics in Medicine* (3), *Statistical Methods in Medical Research* (3)

Conference Activities

Session chair, Section on Bayesian Statistical Science, Joint Statistical Meetings 2021

Judge for student presentation competition at the SC-ASA Palmetto Symposium, 2021

Member of Program Committee, "Your Model is Wrong: Robustness and misspecification in probabilistic modeling," NeurIPS 2021 Workshop

Professional Society Memberships

American Statistical Association

International Society for Bayesian Analysis

International Biometric Society

Professional Development

Certificates

New Faculty Academy Certificate of Completion, University of South Carolina, 2022

Graduate Certificate in Business Administration, Northeastern University, 2009

Workshops Attended

Perspectives in Statistical Modeling and Inference: A Workshop in Honor of Ed George's 70th Birthday, Philadelphia, PA, 2021

Industry Experience

2012-2014 Systems Engineer, General Dynamics Mission Systems

2007-2010 Business Analyst, State Street Bank & Trust

Computer Skills

R, C/C++, Python, MATLAB, Octave, Julia, JAGS, Stan, Windows, Linux