

Ray Bai

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Academic Employment

- 2020- Assistant Professor, University of South Carolina, Department of Statistics
- 2018-2020 Postdoctoral Researcher, University of Pennsylvania, Perelman School of Medicine
Supervisors: Yong Chen and Mary Boland

Education

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

Peer-Reviewed Publications

† = student advised by RB

§ = co-first author

* = alphabetical order

1. **Bai, R.**, Ročková, V., and George, E. I. (2021+). Spike-and-slab meets LASSO: A review of the spike-and-slab LASSO. *Handbook of Bayesian Variable Selection* (Tadesse, M. and Vannucci, M., eds.), Chapman & Hall/CRC Press (in press).
2. **Bai, R.**[§], Moran, G. E.[§], Antonelli, J. L.[§], Chen, Y., and Boland, M. R. (2021). Spike-and-slab group lassos for grouped regression and sparse generalized additive models. *Journal of the American Statistical Association* (in press).
3. 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.
4. **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.

5. Boland, M. R., Liu, J., Balocchi, C., Meeker, J., **Bai, R.**, Mellis, I., Mowery, D. L., and Herman, D. (2021). A method to link neighborhood-level covariates to COVID-19 infection patterns in Philadelphia using spatial regression. *AMIA 2021 Virtual Informatics Summit*, 2021 Mar 24.
6. **Bai, R.** and Ghosh, M. (2019). Large-scale multiple hypothesis testing with the normal-beta prime prior. *Statistics*, **53**: 1210-1233.
7. **Bai, R.** and Ghosh, M. (2018). High-dimensional multivariate posterior consistency under global-local shrinkage priors. *Journal of Multivariate Analysis*, **167**: 157-170.
8. 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.

Submitted Papers

9. **Bai, R.** (2021+). Spike-and-slab group lasso for consistent estimation and variable selection in non-Gaussian generalized additive models. *Revision submitted*.
10. Meeker, J. R., Burris, H. H., **Bai, R.**, Levine, L. D., and Boland, M. R. (2021+). Neighborhood deprivation increases the risk of post-induction cesarean delivery. *Revision submitted*.
11. **Bai, R.**, Lin, L., Boland, M. R., and Chen, Y. (2021+). A robust Bayesian Copas selection model for quantifying and correcting publication bias. *Under revision*.
12. Balocchi, C.[§], **Bai, R.**[§], Liu, J., Canelón, S. P., George, E. I., Chen, Y., and Boland, M. R. (2021+). A Bayesian hierarchical modeling framework for geospatial analysis of adverse pregnancy outcomes. *Under revision*.
13. **Bai, R.**, Boland, M. R., and Chen, Y. (2021+). Fast algorithms and theory for high-dimensional Bayesian varying coefficient models. *Under review*.
14. Deshpande, S. K., **Bai, R.**, Balocchi, C., Starling, J. E., and Weiss, J. (2021+). VCBART: Bayesian trees for varying coefficients. *Under review*.

Manuscripts in Preparation

Bai, R., Jeong, S., and Ročková, V. (2021+). Minimax rates and adaptive procedures for generalized nonparametric regression.

Bai, R. (2021+). Uncertainty quantification for Bayesian vector autoregressive models.

Bai, R., Liu, X., Lin, L., Chu, H., and Chen, Y. (2021+). ABSORB: A Bayesian Selection model for correcting and quantifying Outcome Reporting Bias in multivariate meta-analysis.

Bai, R.* and Qin, Q.* (2021+). Analysis of MCMC algorithms for Gaussian process regression with automatic relevance determination kernels.

Advising

PhD Students Directed

Zile Zhao, expected 2024

Member of Doctoral Committee

Shan Zhong, expected 2023

Anja Zgodic, Department of Epidemiology and Biostatistics (outside member), expected 2023

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 2022). RII Track 1: Materials Assembly and Design Excellence in South Carolina: MADE in SC (OIA-1655740). PI: Prakash Nagarkatti, University of South Carolina. Role: Co-PI. Amount awarded to RB: \$30,000.

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

Professional Society Memberships

American Statistical Association

International Society for Bayesian Analysis

International Biometric Society

Teaching Experience

Average student ratings of the instructor are provided in parentheses (5 = best)

University of South Carolina

STAT 714: Linear Statistical Models, Fall 2021

STAT 718: High-Dimensional Data (special topics course), Spring 2021, 12 students (5/5)

STAT 714: Linear Statistical Models, Fall 2020, 16 students (4.78/5)

University of Florida

STA 3024: Introduction to Statistics II, Spring 2016

Presentations

Invited Seminar Talks and Guest Lectures

1. Seminar, Department of Biostatistics, Virginia Commonwealth University, November 2021
2. Seminar, Department of Statistics, University of Minnesota, October 2021
3. Seminar, Department of Statistics, University of California, Davis, April 2021
4. Seminar, School of Mathematical and Statistical Sciences, Arizona State University, January 2020
5. Seminar, Department of Statistics, Florida State University, January 2020
6. Seminar, Department of Mathematics & Statistics, San Diego State University, January 2020
7. Seminar, Department of Statistics, University of California, Santa Cruz, January 2020
8. Seminar, Department of Statistics, University of South Carolina, January 2020
9. Guest lecture, GCB533: Statistics for Genomics and Biomedical Informatics, University of Pennsylvania, December 2019
10. Statistics Student Seminar, University of Florida, April 2019
11. Invited talk, Department of Biostatistics, Epidemiology, and Informatics, University of Pennsylvania, March 2018

Invited Conference Talks

1. Invited session, CFE-CMStatistics 2021, London, UK, December 2021
2. Invited session, Fifth EAC-ISBA Conference: A Satellite Meeting of the 2020 ISBA World Meeting in Celebrating James O Berger's 70th Birthday, Kunming, Yunnan, China, November 2021
3. Invited session, 2021 ICSA Applied Statistics Symposium (virtual), September 2021

Contributed Talks

1. Joint Statistical Meetings (virtual), August 2021
2. 2021 ISBA World Meeting (virtual), June 2021
3. Joint Statistical Meetings, Denver, CO, July 2019
4. 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

Member of Graduate Committee, 2021-2022

Member of Hiring Committee, 2020-2021, 2021-2022

Member of PhD Qualification Exam Committee, 2020-2021

University of Florida

Organizer of Statistics Student Seminar Series, 2016-2017

Professional Service

Grant reviewer for the National Science Foundation in 2020, 2021

Session chair, Joint Statistical Meetings 2021

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

Judge for SBSS Student Paper Competition, 2020

Journal reviewer for 17 papers: *The American Statistician* (1), *Annals of the Brazilian Academy of Sciences* (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* (3), *Lifetime Data Analysis* (1), *The R Journal* (1), *Research Synthesis Methods* (1), *Scandinavian Journal of Statistics* (1), *Science China Mathematics* (1), *Statistics and Computing* (1), *Statistics in Medicine* (1), *Statistical Methods in Medical Research* (1)

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