

# ANINDYA BHADRA

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- CONTACT INFORMATION Department of Statistics Phone: (765) 496-9551  
Purdue University Fax: (765) 494-0558  
250 N. University St. E-mail: [bhadra@purdue.edu](mailto:bhadra@purdue.edu)  
West Lafayette, IN 47907-2066. Web: <http://www.stat.purdue.edu/~bhadra>
- RESEARCH INTERESTS Bayesian methods for high-dimensional and complex data; computational statistics; applications of statistics in the life sciences (genomics, infectious disease epidemiology and nutrition).
- ACADEMIC EMPLOYMENT
- Associate Professor, Statistics, Purdue University, August 2018 – present.
  - Assistant Professor, Statistics, Purdue University, August 2012 – August, 2018.
- EDUCATION & TRAINING
- Postdoctoral Fellow, Statistics, Texas A&M University, September 2010 – July, 2012.
  - Ph.D., Statistics, University of Michigan, Ann Arbor, August 2010.
  - M. A., Statistics, University of Michigan, Ann Arbor, April 2007.
  - Bachelor of Technology (Honors), Electronics and Electrical Communication Engineering, Indian Institute of Technology, Kharagpur, May 2004.
- AWARDS AND HONORS
- Excellence in Research/Seed for Success Award, Purdue University, 2017.
  - Outstanding Assistant Professor Undergraduate Teaching Award, Purdue University Department of Statistics, 2016.
  - Elected Member, International Statistical Institute, 2015.
  - New Researcher Fellow, Statistical and Applied Mathematical Sciences Institute (SAMSI), Fall 2014.
- PUBLICATIONS
- Methodological Publications:**  
\* equal contribution  
<sup>g</sup> graduate student collaborator
1. **Bhadra, A.**, Datta, J., Li, Y.<sup>g</sup>, Polson, N. G. and Willard, B. (2019). Prediction risk for the horseshoe regression. *Journal of Machine Learning Research* (accepted, pending minor revisions).
  2. Li, Y.<sup>g</sup>, Craig, B. A. and **Bhadra, A.** (2019). The graphical horseshoe estimator for inverse covariance matrices. *Journal of Computational and Graphical Statistics* (to appear).
  3. **Bhadra, A.**, Rao, A. and Baladandayuthapani, V. (2018). Inferring network structure in non-normal and mixed discrete-continuous genomic data. *Biometrics* **74**, 185–195.
  4. **Bhadra, A.** (2017). An expectation-maximization scheme for measurement error models. *Statistics and Probability Letters* **120**, 61–68.
  5. **Bhadra, A.**, Datta, J., Polson, N. G. and Willard, B. (2017). The horseshoe+ estimator of ultra-sparse signals. *Bayesian Analysis* **12**, 1105–1131.

6. **Bhadra, A.**, Datta, J., Polson, N. G. and Willard, B. (2016). Default Bayesian analysis with global-local shrinkage priors. *Biometrika* **103**, 955–969.
7. **Bhadra, A.** and Carroll, R. J. (2016). Exact sampling of the unobserved covariates in Bayesian spline models for measurement error problems. *Statistics and Computing* **26**, 827–840.
8. **Bhadra, A.** and Ionides, E. L. (2016). Adaptive particle allocation in iterated sequential Monte Carlo via approximating meta-models. *Statistics and Computing* **26**, 393–407.
9. Feldman, G.<sup>g</sup>, **Bhadra, A.** and Kirshner, S. (2014). Bayesian feature selection in high-dimensional regression in presence of correlated noise. *Stat* **3**, 258–272.
10. **Bhadra, A.** and Baladandayuthapani, V. (2013). Integrative sparse Bayesian analysis of multi-platform genomic data in glioblastoma. *2013 IEEE International Workshop on Genomic Signal Processing and Statistics (GENSIPS 2013)*, pp. 1–4.
11. **Bhadra, A.** and Mallick, B. K. (2013). Joint high-dimensional Bayesian variable and covariance selection with an application to eQTL analysis. *Biometrics* **69**, 447–457. (**Highlights, June 2013 issue**)
12. **Bhadra, A.**, Ionides, E. L., Laneri, K., Pascual, M., Bouma, M. and Dhiman, R. C. (2011). Malaria in Northwest India: Data analysis via partially observed stochastic differential equation models driven by Lévy noise. *Journal of the American Statistical Association* **106**, 440–451. (**Featured article, JASA Applications & Case Studies, June 2011 issue**)
13. Ionides, E. L., **Bhadra, A.**, Atchadé, Y. and King, A. A. (2011). Iterated filtering. *Annals of Statistics* **39**, 1776–1802.
14. **Bhadra, A.** (2011). Invited discussion of “Riemann manifold Langevin and Hamiltonian Monte Carlo methods” by M. Girolami and B. Calderhead. *Journal of the Royal Statistical Society, Series B* **73**, 173–174.
15. Laneri, K.\*, **Bhadra, A.\***, Ionides, E. L., Bouma, M., Dhiman, R. C., Yadav, R. S. and Pascual, M. (2010). Forcing versus feedback: Epidemic malaria and monsoon rains in Northwest India. *PLoS Computational Biology* **6**, e1000898. (**Cover article, September 2010 issue**)
16. **Bhadra, A.** (2010). Contributed discussion of “Particle Markov chain Monte Carlo methods” by C. Andrieu, A. Doucet and R. Holenstein. *Journal of the Royal Statistical Society, Series B* **72**, 314–315.

#### **Applied Publications:**

17. Bailey, R. L., Dodd, K. W., Gahche, J. J., Dwyer, J. T., Cowan, A. E., Jun, S., Eicher-Miller, H. A., Guether, P. M., **Bhadra, A.**, Thomas, P. R., Potischman, N., Carroll, R. J., Tooze, J. A. (2019). Best Practices for Dietary Supplement Assessment and Estimation of Total Usual Nutrient Intakes in Population-Level Research and Monitoring. *Journal of Nutrition (to appear)*.
18. Jun, S., Cowan, A. E., Tooze, J. A., Gahche, J. J., Dwyer, J. T., Eicher-Miller, H. A., **Bhadra, A.**, Guenther, P. M., Potischman, N., Dodd, K. W. and Bailey, R. L. (2018). Dietary Supplement Use among U.S. Children by Family Income, Food Security Level, and Nutrition Assistance Program Participation Status in 2011–2014. *Nutrients (Special Issue on Advances in Dietary Supplements)* **10**, 1212.

19. Cowan, A. E., Jun, S., Gahche, J. J., Tooze, J. A., Dwyer, J. T., Eicher-Miller, H. A., **Bhadra, A.**, Guenther, P. M., Potischman, N., Dodd, K. W. and Bailey, R. L. (2018). Dietary Supplement Use Differs by Socioeconomic and Health-Related Characteristics among U.S. Adults, NHANES 2011–2014. *Nutrients (Special Issue on Advances in Dietary Supplements)* **10**, 1114.

#### Selected Preprints:

1. **Bhadra, A.**, Datta, J., Polson, N. G. and Willard, B. (2019+). Lasso meets horseshoe: a survey. (*minor revisions requested, Statistical Science*). [[arXiv:1706.10179](https://arxiv.org/abs/1706.10179)]
2. **Bhadra, A.**, Datta, J., Polson, N. G. and Willard, B. (2019+). Horseshoe regularization for feature subset selection. (*submitted*). [[arXiv:1702.07400](https://arxiv.org/abs/1702.07400)]
3. **Bhadra, A.**, Datta, J., Polson, N. G. and Willard, B. (2019+). Global-local mixtures. (*submitted*). [[arXiv:1604.07487](https://arxiv.org/abs/1604.07487)]

#### EXTERNAL GRANTS

- “DMS-1613063: Bayesian global-local shrinkage in high dimensions,” National Science Foundation (NSF), 2016–2019. Role: PI.
- “R01CA215834: Development of a total nutrient index,” National Cancer Institute (NCI), 2017–2021. Role: Co-I.
- “R21CA224764: Temporal dietary and physical activity patterns related to health outcomes,” National Cancer Institute (NCI), 2018–2020. Role: Co-I.

#### TEACHING

- STAT 355: Statistics for Data Science (Spring 2018; Fall 2018).
- STAT 417: Statistical Theory (Spring 2017, 2016; Fall 2015).
- STAT 546: Computational Statistics (Spring 2016, 2015, 2014).
- STAT 503: Statistical Methods for Biology (Spring 2015, 2014, 2013; Fall 2017; 2016, 2012).

#### INVITED PRESENTATIONS

##### Department Seminars:

1. **Default Bayes and prediction problems with global-local shrinkage priors** - Department of Bioinformatics and Biostatistics, University of Louisville, Louisville, KY, September, 2017.
2. **Default Bayes and prediction problems with global-local shrinkage priors** - Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, Notre Dame, IN, February, 2017.
3. **Default Bayes and prediction problems with global-local shrinkage priors** - Department of Statistics and Probability, Michigan State University, East Lansing, MI, November, 2016.
4. **Default Bayes and prediction problems with global-local shrinkage priors** - Department of Statistics, University of Missouri, Columbia, MO, November, 2016.
5. **Default Bayes and prediction problems with global-local shrinkage priors** - Department of Biostatistics, Indiana University School of Medicine, Indianapolis, IN, November, 2016.

6. **The horseshoe+ estimator of sparse signals** - Department of Statistics, Northwestern University, Evanston, IL, January, 2015.
7. **The horseshoe+ estimator of sparse signals** - Department of Statistics, Iowa State University, Ames, IA, November, 2014.
8. **High-dimensional joint Bayesian variable and covariance selection: Applications in eQTL analysis and cancer genomics** - Department of Statistics, University of Minnesota, Minneapolis, MN, February, 2014.
9. **High-dimensional joint Bayesian variable and covariance selection: Applications in eQTL analysis and cancer genomics** - Department of Mathematics, Statistics and Computer Science, Marquette University, Milwaukee, WI, January, 2014.
10. **High-dimensional joint Bayesian variable and covariance selection: Applications in eQTL analysis and cancer genomics** - Department of Biostatistics, University of Louisville, Louisville, KY, September, 2013.
11. **Joint high-dimensional Bayesian variable and covariance selection with an application to eQTL analysis** - Division of Statistics, Northern Illinois University, DeKalb, IL, March, 2013.
12. **Joint high-dimensional Bayesian variable and covariance selection with an application to eQTL analysis** - Department of Biostatistics, The University of Texas MD Anderson Cancer Center, Houston, TX, October, 2012.
13. **Joint high-dimensional Bayesian variable and covariance selection with an application to eQTL analysis** - Department of Mathematics, Statistics and Computer Science, The University of Illinois at Chicago, Chicago, IL, September, 2012.
14. **Simulation-based maximum likelihood inference for partially observed Markov process models** - Department of Statistics, Purdue University, West Lafayette, IN, February 2012.
15. **Simulation-based maximum likelihood inference for partially observed Markov process models** - Department of Statistics, George Washington University, Washington, DC, February 2012.
16. **Simulation-based maximum likelihood inference for partially observed Markov process models** - Department of Statistics, Florida State University, Tallahassee, FL, January 2012.
17. **Simulation-based maximum likelihood inference for partially observed Markov process models** - Department of Statistics and Actuarial Science, University of Waterloo, Waterloo, ON, January 2012.

**Other Invited Presentations:**

1. **The graphical horseshoe estimator for inverse covariance matrices** - Invited talk, ASA Conference on Statistical Learning and Data Science / Nonparametric Statistics, New York City, NY, June 2018.
2. **The graphical horseshoe estimator for inverse covariance matrices** - Invited talk, IISA Conference, Gainesville, FL, May 2018.
3. **Prediction risk for global-local shrinkage regression** - Invited talk, The 10th ICSA International Conference, Shanghai, China, December 2016.

4. **Prediction risk for global-local shrinkage regression** - Invited talk, Latent Variables 2016 Conference, Columbia, SC, October 2016.
5. **Prediction risk for global-local shrinkage regression** - Topic-contributed talk, Joint Statistical Meetings, Chicago, IL, August 2016.
6. **Prediction risk for global-local shrinkage regression** - Invited talk, 2016 ICSA Applied Statistics Symposium, Atlanta, GA, June 2016.
7. **The horseshoe+ estimator of sparse signals** - Young researchers special invited talk (45 minutes), 2015 IISA Conference, Pune, India, December 2015.
8. **Bayesian feature selection in high-dimensional regression in presence of correlated noise** - Invited talk, 2014 IISA Conference, Riverside, CA, July, 2014.
9. **Bayesian feature selection in high-dimensional regression in presence of correlated noise** - Invited talk, ISBIS and SLDM meeting, Durham, NC, June, 2014.
10. **High-dimensional joint Bayesian variable and covariance selection: Applications in eQTL analysis and cancer genomics** - Invited talk, International Conference in Honor of H. N. Nagaraja, Richardson, TX, March, 2014.
11. **Screening strategies for high-dimensional multiple predictor, multiple response data with an application in genomics** - Topic-contributed talk, Joint Statistical Meetings, Montréal, QC, August 2013.
12. **Joint high-dimensional Bayesian variable and covariance selection with an application to eQTL analysis** - Invited talk, Statistical Bioinformatics Seminar Series, Purdue University, West Lafayette, IN, February, 2013.
13. **Joint high-dimensional Bayesian variable and covariance selection with an application to eQTL analysis** - Invited talk, Machine Learning and Applications Seminar Series, Purdue University, West Lafayette, IN, October, 2012.
14. **Joint high-dimensional Bayesian variable and covariance selection with an application to eQTL analysis** - Topic-contributed talk, Joint Statistical Meetings, San Diego, CA, August 2012.
15. **Joint high-dimensional Bayesian variable and covariance selection with an application to eQTL analysis** - Invited minisymposium talk, SIAM Conference on the Life Sciences, San Diego, CA, August 2012.
16. **Joint high-dimensional Bayesian variable and covariance selection with an application to eQTL analysis** - Invited talk, The Third Biennial Workshop on Nutrition, Biostatistics and Bioinformatics, College Station, TX, February 2012.
17. **An adaptive particle allocation scheme for off-line iterated sequential importance sampling based techniques** - Invited talk, Yahoo! Research (Machine Learning Division), Santa Clara, CA, June 2011.
18. **An adaptive particle allocation scheme for off-line iterated sequential importance sampling based techniques** - Invited talk, 2011 IISA Conference on Probability, Statistics and Data Analysis, Raleigh, NC, April 2011.
19. **Iterated filtering and its applications in modeling infectious disease dynamics** - Invited talk, Department of Biostatistics, The University of Texas MD Anderson Cancer Center, Houston, TX, February 2010.

20. **Malaria transmission: Modeling and inference** - Invited talk, Parameter estimation for dynamical systems workshop, EURANDOM, Technische Universiteit Eindhoven, Eindhoven, The Netherlands, June 2009.

PROFESSIONAL  
ACTIVITIES

- **Editorial Service:** Associate Editor, *Sankhya A*, 2018 – present.
- **Journal Referee Service:** *Annals of Applied Statistics*; *Bayesian Analysis*; *Bioinformatics*; *Biometrics*; *Biometrika*; *Biostatistics*; *Computational Statistics and Data Analysis*; *Epidemics*; *IEEE Transactions on Biomedical Engineering*; *Journal of Agricultural, Biological, and Environmental Statistics*; *Journal of the American Statistical Association*; *Journal of Business and Economic Statistics*; *Journal of Computational and Graphical Statistics*; *Journal of the Royal Society Interface*; *Journal of the Royal Statistical Society: Series C (Applied Statistics)*; *Statistica Sinica*; *Statistics and Probability Letters*; *Statistics in Biosciences*; *Statistics in Medicine*.
- **Program Committee Member:** The 18th International Conference on Artificial Intelligence and Statistics (AISTATS 2015).
- **Grant Reviewer:** National Security Agency (NSA).
- **Session Organizer:** “Scalable Bayesian Methods for Large and Complex Data (Invited),” 9th International Purdue Symposium on Statistics, West Lafayette, IN, June 2018; “High-dimensional Bayesian statistics: spike and slab and global-local shrinkage (Invited),” Joint Statistical Meetings, Chicago, IL, August 2016; “Statistical Methods with Applications in Biological and Epidemiological Research (Topic-contributed),” Joint Statistical Meetings, Montréal, QC, August 2013.
- **Session Chair:** “Scalable Bayesian Methods for Large and Complex Data,” 9th International Purdue Symposium on Statistics, West Lafayette, IN, June 2018; “Statistical methods for large scale data analysis,” IISA Conference, Gainesville, FL, May 2018; “Statistical Models of Risk of Chronic Diseases,” ISBIS and SLDM Meeting, Durham, NC, June, 2014; “Testing,” 2011 IISA Conference on Probability, Statistics and Data Analysis, Raleigh, NC, April 2011; “Miscellaneous Methodology III,” Joint Statistical Meetings, Washington, DC, August 2009.