

Andrew J. Holbrook, Ph.D.

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Research Interests

Bayesian statistics and machine learning, dimension reduction, computational neuroscience, spatial epidemiology
Dissertation title: *Geometric Bayes*; Advisor: Prof. Babak Shahbaba, Ph.D.

Education

2013-2018, Ph.D., Statistics, University of California, Irvine, CA
2013-2015, M.S., Statistics, University of California, Irvine, CA
2005-2009, B.A., German and Classical Languages, *with Honors*, University of California, Berkeley, CA

Awards and Academic Honors

NIH K25 Career Development Award (2020-2025)
Leonard J. Savage Award, International Society for Bayesian Analysis (2018)
Honorable Mention for a Dissertation in Theory and Methods
Carl W. Cotman Young Investigator Award, UCI MIND (2018)
UC Irvine Graduate Dean's Dissertation Fellowship Award (2017-2018)
UCI MIND Aging Fellowship (2015-2017)
Robert L. Newcomb 1st Year Graduate Student Award, UC Irvine Department of Statistics (2014)

Refereed Publications

12. Shahbaba B, Lan S, Streets J, **Holbrook A**. *Nonparametric Fisher geometry with application to density estimation*. Proceedings of the 36th Conference on Uncertainty in Artificial Intelligence (UAI), PMLR vol. 124, 2020.
11. **Holbrook A**, Tustison N, Marquez F, Roberts J, Yassa M, Gillen D. *Anterolateral entorhinal cortex thickness as a biomarker for early detection of Alzheimer's disease*. In press at Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring, 2020.
10. **Holbrook A**, Lemey P, Baele G, Dellicour S, Brockmann D, Rambaut A, Suchard M. *Massive parallelization boosts big Bayesian multidimensional scaling*. In press at Journal of Computational and Graphical Statistics, 2020.
9. Ji X, Zhang Z, **Holbrook A**, Nishimura A, Baele G, Rambaut A, Lemey P, Suchard M. *Gradients do grow on trees: a linear-time $O(N)$ -dimensional gradient for statistical phylogenetics*. In press at Molecular Biology and Evolution, 2020.
8. Lan S, **Holbrook A**, Elias G, Fortin N, Ombao H, Shahbaba B. *Flexible Bayesian Dynamic Modeling of Correlation and Covariance Matrices*. In press at Bayesian Analysis, 2020.
7. **Holbrook A**, Lumley T, Gillen D. *Estimating prediction error for complex samples*. Canadian Journal of Statistics, vol. 48, no. 2, pp. 204-221, 2020.
6. Tustison N, **Holbrook A**, Avants B, Roberts J, Cook P, Reagh Z, Stone J, Gillen D, Yassa M. *Longitudinal mapping of cortical thickness measurements: an Alzheimer's Disease Neuroimaging Initiative-based evaluation study*. Journal of Alzheimer's Disease, vol. 71, no. 1, pp. 165-183, 2019.

5. Li L, **Holbrook A**, Shahbaba B, Baldi P. *Neural network gradient Hamiltonian Monte Carlo*. Computational Statistics, vol. 34, no. 1, pp. 281-299, 2019.
4. **Holbrook A**. *Differentiating the pseudo determinant*. Linear Algebra and its Applications, vol. 548, pp. 293-304, 2018.
3. **Holbrook A**, Lan S, Vandenberg-Rodes A, Shahbaba B. *Geodesic Lagrangian Monte Carlo over the space of positive definite matrices: with application to Bayesian spectral density estimation*. Journal of Statistical Computation and Simulation, vol. 88, no. 5, pp. 982-1002, 2018.
2. **Holbrook A**, Vandenberg-Rodes A, Fortin N, Shahbaba B. *A Bayesian supervised dual-dimensionality reduction model for simultaneous decoding of LFP and spike train signals*. Stat Journal, vol. 6, no. 1, pp. 53-67, 2017.
1. Grill J, **Holbrook A**, Pierce A, Hoang D, Gillen D. *Attitudes toward Potential Participant Registries*. Journal of Alzheimer's Disease, vol. 56, no. 3, pp. 939-946, 2017.

Current Support

NIH NIAID K25 AI153816 (PI) 06/01/2020 - 05/31/2025, \$106,467/year.
 Title: Big Data Predictive Phylogenetics with Bayesian Learning

Invited Talks

3. Johns Hopkins University, Department of Biostatistics, Bayesian Learning and Spatial Temporal modeling (BLAST) working group, "Bayes in the time of Big Data" (Baltimore, MD; Oct 2020)
2. JSM Savage Award Session, "Excerpts from *Geometric Bayes*" (Denver, CO; Aug 2019)
1. Statistical Methods in Imaging, "Evaluating the ANTs longitudinal cortical thickness pipeline" (Irvine, CA; Jun 2019)

Teaching

- Teaching Assistant, Stat 7 – Introduction to Probability and Statistics (Fall 2014, Summer 2015); Department of Statistics, University of California, Irvine
- Teaching Assistant, Stat 8 – Biostatistics (Winter 2015); Department of Statistics, University of California, Irvine
- Teacher, Mathematics and English as a Second Language (2010-2011); Dalian American International School

Professional Experience

- Postdoctoral scholar with Prof. Marc A. Suchard, M.D., Ph.D. at the Department of Human Genetics, University of California, Los Angeles; Los Angeles, California (2018-2020)
- Statistical consultant, the Alzheimer's Disease Research Center at the University of California, Irvine; Irvine, California (2015-2017)
- Statistical consultant, the Center for Statistical Consulting at the University of California, Irvine; Irvine, California (Winter and Spring 2014)
- Trainee, the Summer Institute for Training in Biostatistics at North Carolina State University and the Duke Clinical Research Institute; Raleigh, North Carolina (Summer 2013)
- Teacher, the Dalian American International School; Dalian, People's Republic of China (2010-2011)

Service and Community Involvement

- Lead organizer, *Conference on philosophy of machine learning: knowledge and causality*. March 17-18, 2018 at the University of California, Irvine

- Member, American Statistical Association (2018-present)
- Member, International Society for Bayesian Analysis (2020-present)

Journal Reviewer

Alzheimer's & Dementia: The Journal of the Alzheimer's Association

Bayesian Analysis ($\times 2$)

IEEE Transactions on Industrial Electronics

Scandinavian Journal of Statistics

SIAM Journal on Matrix Analysis and Applications