Sharmodeep Bhattacharyya

Department of Statistics, Oregon State University
239 Weniger Hall, Corvallis, OR 97331-4606
Citizenship: India

Mobile: (510) 316-5956
Email: bhattash@stat.oregonstate.edu
Website: http://science.oregonstate.edu/~bhattash

Current Position

Assistant Professor,

Oregon State University,

Mar, 2015 - Present.

Previous Position

Post-doctoral Researcher,

University of California, Berkeley,

Jan, 2014 - Feb, 2015.

Education

Ph.D. Statistics, University of California, Berkeley, Fall 2013.

Specialization: Designated Emphasis in Communication, Computation and Statistics.

M.Stat., Indian Statistical Institute, 2008.

Specialization: Mathematical Statistics and Probability.

B.Stat.(Hons.), Indian Statistical Institute, Kolkata, 2006.

Research Fields

Statistics on graphs and networks: Inference on statistics of networks, community detection in sparse networks, semi parametric modeling of networks.

Statistical Application in Neuroscience: Analysis of multi-electrode array data using high-dimensional time-series and simultaneous equations models and network inference methods.

High-dimensional structured density estimation: Estimation of elliptical and shape-constrained densities in high-dimensions.

Unsupervised learning especially clustering and manifold learning: Developing a theoretical framework for clustering using using level set, clustering on high-dimensional data, unified framework for clustering algorithm.

Multiple hypothesis testing: Control of FWER and FDR under correlated hypothesis.

Semiparametric and nonparametric statistical techniques and Time-series analysis.

Research

Refereed Publications

Bhattacharyya, S., and Chatterjee, S., 2020. Consistent Recovery of Communities from Sparse Multi-relational Networks: A Scalable Algorithm with Optimal Recovery Conditions. *Complex Networks XI (pp. 92-103). Springer, Cham.*

Ruiz, T., Balasubhramanian, M., Bouchard, K. and **Bhattacharyya, S.**, 2020. Sparse and Low-bias Estimation of High Dimensional Vector Autoregressive Models. *Proceedings of Machine Learning Research, Vol - 120, pg - xx-xx.*

Balasubramanian, M., Ruiz, T., Cook, B., **Bhattacharyya, S.**, Shrivastava, A. and Bouchard, K., 2020. Scaling of Union of Intersections for Inference of Granger Causal Networks from Observational Data. *Proceedings of 34th IEEE International Parallel and Distributed Processing Symposium.*

Gent, D. H., **Bhattacharyya, S.**, and Ruiz, T., 2019. Prediction of Spread and Regional Development of Hop Powdery Mildew: A Network Analysis. *Phytopathology, 109(8), 1392-1403.*

Bouchard, K., Sachdeva, P., **Bhattacharya, S.**, Balasubramanian, M. and Ubaru, S., 2019. Union of Intersections (UoI) for interpretable data driven discovery and prediction in neuroscience. *Cosyne Abstracts 2019, Lisbon, PT.*

Sachdeva, P. S., **Bhattacharyya, S.**, and Bouchard, K. E., 2019. Sparse, Predictive, and Interpretable Functional Connectomics with UoI Lasso. *41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) (pp. 1965-1968). IEEE.*

Bouchard, K., Bujan, A., Roosta-Khorasani, F., Ubaru, S., Prabhat, M., Snijders, A., Mao, J.H., Chang, E., Mahoney, M.W. and **Bhattacharya, S.**, 2017. Union of Intersections (UoI) for Interpretable Data Driven Discovery and Prediction. In *Advances in Neural Information Processing Systems (pp. 1078-1086).*

Bhattacharyya, S. and Bickel, P.J., 2016. Spectral clustering and block models: A review and a new algorithm. In *Statistical Analysis for High-Dimensional Data (pp. 67-90). Springer, Cham.*

Bhattacharyya, S. and Bickel, P.J., 2015. Subsampling bootstrap of count features of networks. *Annals of Statistics, 43(6), pp.2384-2411.*

In Review

Bhattacharyya, S. and Chatterjee, S., 2020. General Community Detection with Optimal Recovery Conditions for Multi-relational Sparse Networks with Dependent Layers. (Revision Submitted in *Annals of Statistics*).

Li, T., Lei, L., **Bhattacharyya, S.**, Van den Berge, K., Sarkar, P., Bickel, P. J., and Levina, E., 2020. Hierarchical community detection by recursive bi-partitioning. (Revision Submitted in *Journal of American Statistical Association*).

Non-Refereed Proceedings Articles

Niyaghi, F., **Bhattacharyya, S.** and Emerson, S., 2017. Variable Selection Using Intersection and Average of Random Forests. In *JSM 2017 Proceedings.*

Bhattacharyya, S., Richards, J.W., Rice, J., Starr, D.L., Butler, N.R. and Bloom, J.S., 2012. Identification of outliers through clustering and semi-supervised learning for all sky surveys. In *Statistical Challenges in Modern Astronomy V (pp. 483-485). Springer, New York, NY.*

Non-refereed Publications

Bhattacharyya, S., and Chatterjee, S., 2020. General Community Detection with Optimal Recovery Conditions for Multi-relational Sparse Networks with Dependent Layers. *arXiv preprint arXiv:2004.03480.*

Ruiz, T., Balasubramanian, M., Bouchard, K. E., and **Bhattacharyya, S.**, 2019. Sparse, Low-bias, and Scalable Estimation of High Dimensional Vector Autoregressive Models via Union of Intersections. *arXiv preprint arXiv:1908.11464.*

Li, T., **Bhattacharyya, S.**, Sarkar, P., Bickel, P. J., and Levina, E., 2018. Hierarchical community detection by recursive bi-partitioning. *arXiv preprint arXiv:1810.01509.*

Balasubramanian, M., Ruiz, T., Cook, B., **Bhattacharyya, S.**, Shrivastava, A. and Bouchard, K., 2018. Optimizing the Union of Intersections LASSO (UoILASSO) and Vector Autoregressive (UoIVAR) Algorithms for Improved Statistical Estimation at Scale. *arXiv preprint arXiv:1808.06992.*

Bhattacharyya, S., and Chatterjee, S., 2018. Spectral clustering for multiple sparse networks: I. *arXiv preprint arXiv:1805.10594.*

Bhattacharyya, S. and Bickel, P.J., 2014. Adaptive estimation in elliptical distributions with extensions to high dimensions. *Preprint.*

Bhattacharyya, S. and Bickel, P.J., 2014. Community detection in networks using graph distance. *arXiv preprint arXiv:1401.3915.*

Bhattacharyya, S. and Bickel, P.J., 2011. A naive approach to finding number of clusters in partitioning clustering. *Preprint.*

WORKING PAPERS

Generalized VAR: Union of Intersections method for Generalized Vector autoregressive models, (With Dr. Sarah Emerson and Trevor Ruiz).

Online changepoint detection in networks, (With Dr. Shirshendu Chatterjee, Neil Hwang and Jiarui Xu).

Epidemiological network for downey mildew spread in hops plant, (With Dr. David Gent and Trevor Ruiz).

Changepoint detection in sequence of network data, (With Dr. Shirshendu Chatterjee and Dr. Soumendu Mukherjee).

Changepoint detection in river flow data, (With Dr. Claudio Fuentes and Christopher Skypeck).

Theoretical Analysis of Clustering: Attempting to give a theoretical foundation to clustering by linking metric and density-based methods and thus developing better clustering algorithms for both low and high-dimensional datasets. (With Prof. Peter Bickel)

Underline indicates graduate student

GRANTS

Workshop in Banff International Research Station on *New Directions in Statistical Inference on Networks and Graphs*, Time: Sep 19-24, 2021, (PI: Sharmodeep Bhattacharyya, OSU and co-PI: Elizaveta Levina, UMich, co-PI: Carey Priebe, JHU, co-PI: Tianxi Li, UVirginia).

DARPA grant: Predictive and Interpretive Analysis of Neural Time-Series Data, Amount: $50,000, Time: 2017-2018, (PI: Kenneth Kosik, UCSB and co-PI: Kristofer Bouchard, LBNL)

Oregon BEST grant: Integrated Decision Support for Irrigation Management, Amount: $20,000, Time: 2016-2018, (PI: Clinton Shock, OSU)

USDA grant: A production system for high value crops at risk from downy mildew: Integrating detection, breeding, extension, and education, Amount: $150,000, Time: 2016-2019, (PI: Mary Hausbeck, MSU)

UC Davis grant: Network Characteristics and Modeling of Powdery Mildew Spread: Foundations for Area-Wide IPM, Amount: $20,000, Time: 2016-2017, (PI: David Gent)

The Automated Detection of R Cor Bor Stars - Spectroscopic Confirmation by Adam Miller, Joseph W. Richards, Sharmodeep Bhattacharyya, Dan L. Starr and Joshua S. Bloom. Accepted in *National Optical Astronomy Observatory.*

INTERNSHIP

Summer 2010: Quantitative Marketing Research Group, Google Inc., Mountain View, CA.
Project: *Model-based Advertiser Diagnostics: Local interpretation of Black-Box Models.*

Talks

Conference and Poster Presentations

Invited Talk, International Indian Statistical Association Conference 2019, Mumbai, India, December 2019.

Invited Talk, Indian Statistical Institute, Kolkata, India, December, 2018.

Invited Talk, International Workshop on Network Data Analysis, Changchun, China, October, 2018.

Invited Talk, Statistics of Network Analysis Workshop, The Alan Turing Institute, London, UK, May 2018.

Invited Talk, Statistics Department Seminar, UC Riverside, March 2018.

Invited Talk, International Indian Statistical Association Conference 2017, Hyderabad, India, December 2017.

Invited Talk, Joint Statistical Meetings 2017, Baltimore, MD, July 2017.

Invited Talk, Probability Seminar, Oregon State University, May 2017.

Invited Talk, Johns Hopkins University, Applied Math Seminar, Dec 2016.

Invited Talk CMStatistics, Dec 2016.

Invited Talk, JSM 2016.

Invited Talk, Theoretical Foundations of Statistical Network Analysis Programme at INI for Mathematical Sciences, Cambridge, UK, June 2016.

Data Science Innovation Lab 2016: Mobile Health, UCLA 2016

Invited Talk, IISA 2015 conference, Pune, India.

Invited Talk, UCLA Department of Statistics.

Challenges in Computational Neuroscience workshop in SAMSI, 2015.

Invited Talk, JSM 2015.

Invited Talk, Theory of Big Data Workshop, UCL, January, 2015.

IMS New Researchers Conference, Harvard University, August, 2014.

Invited Talk, Conference of International Indian Statistical Association, July, 2014.

Invited Talk, Second Conference of International Society of Non-Parametric Statistics, June, 2014.

Invited Talk, Oregon State University, March, 2014.

Invited Talk, Networks with Community Structure Workshop, EURANDOM, January, 2014.

Joint Statistical Meeting, San Diego, 2012.

World Congress of Probability and Statistics, Istanbul, 2012.

Statistical Challenges in Modern Astronomy V, Penn State University, June 13-17, 2011.

Complex Networks Transition Workshop, SAMSI, June 6-7, 2011

Sixth International Triennial Kolkata Symposium on Probability & Statistics, University of Calcutta, Dec 29-31, 2006.

Unpublished Papers

Analysis of Arsenic Data in Gangetic Delta, with M. A. Hussain, R. Guhaniyogi, U. Pal (2006).

A Study of Optimal Partitioning Algorithms in Cluster Analysis (Master's Thesis), under Prof. Probal Chaudhuri (2008)

Teaching

INSTRUCTOR AT OREGON STATE UNIVERSITY

ST 412/512, Spring 2016, Winter 2017, Spring 2019: Methods of Data Analysis II

ST 538, Spring 2018, 2019, 2020: Statistical Methods for Large and Complex Datasets (Online)

ST 552, Winter 2017, 2018, 2020: Statistical Methods II

ST 557, Fall 2017: Applied Multivariate Analysis

ST 562, Winter 2016: Theory of Statistics II

ST 595, Fall 2018, Fall, Spring and Winter 2019, Spring and Winter 2020: Capstone Project (Online)

ST 599, Spring 2015: Modern Statistical Methods for Large and Complex Data Sets.

INSTRUCTOR AT UNIVERSITY OF CALIFORNIA, BERKELEY

Stat 131A, Fall 2012: Statistical Inference for Biological Scientists

TA IN GRADUATE COURSES AT UNIVERSITY OF CALIFORNIA, BERKELEY

Stat 210A, Fall 2009: Theoretical Statistics

Stat 210B, Spring 2012: Theoretical Statistics

TA IN UNDERGRADUATE COURSES AT UNIVERSITY OF CALIFORNIA, BERKELEY

Stat 151B, Spring 2010: Modern Applied Statistics and Machine Learning.

Stat 20, Fall 2010: Introductory Statistics

Honors & Awards

AWARDS

Bay Area ASA travel grant award for JSM, 2012.

NSF travel grant award for World Congress in Probability and Statistics, Instanbul, 2012.

ISIAA Mrs. M.R. Iyer Gold Medal for Outstanding Achievement, M.Stat, Indian Statistical Institute, Kolkata, 2008.

Awards for excellent academic performance in eight semesters, Indian Statistical Institute, Kolkata, 2004–2008.

SCHOLARSHIPS

D.V. Gokhale Grant in Statistics, IIE, 2008-2009.

National Talent Search Examination Scholarship, NCERT, Govt. of India, 2001.

Jagadis Bose National Science Talent Search Scholarship, 2003.

Computer Skills

C, Fortran, Python, Matlab, Mathematica, R, SAS, SQL, LATEX.