Pritam Dey

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Bio

I am a statistician working on developing statistical models motivated by real-world scientific problems. My current work spans methodological advances in variational inference and symbolic regression, as well as application-driven research in spatial transcriptomics, multi-omic data integration, neuroscience, and materials science. I aim to design efficient and robust models that enable and accelerate scientific discovery.

Work Experience

Postdoctoral Research Associate, *Texas A&M University* *Sep 2023–Present*
Working in several collaborative teams from the Departments of Statistics and Nutrition to develop Bayesian frameworks and computational tools for spatial transcriptomics, dietary microbiome studies, and multi-omic biomarker discovery.

Graduate Research Assistant, *Duke University* *Jan 2019–Aug 2024*
Research Assistant developing statistical models for brain structural connectomics, including outlier detection and hierarchical continuous network representation.

Graduate Teaching Assistant, *Duke University* *Aug 2019–Aug 2024*
Led labs and performed grading for graduate-level courses: Linear Models (Fall 2019), Probability (Summer 2020), Probability and Measure Theory (Fall 2020), Predictive Modelling and Statistical Learning (Fall 2021), Probabilistic Machine Learning (Spring 2023).

Education

Ph.D. in Statistical Science, *Duke University* *2018–2023*

- Advised by Dr. David B. Dunson.
- **Dissertation Title:** Some Advances in Statistical modeling of Brain Structural Connectomes.

M.S. in Statistical Science, *Duke University* *2018–2023*

Master of Statistics, *Indian Statistical Institute, Kolkata* *2016–2018*

Bachelor of Mathematics (Hons.), *Indian Statistical Institute, Bangalore* *2013–2016*

- **Award:** S.H. Aravind Gold Medal for academic performance

Technical Skills

- **Statistics**: Bayesian Statistics, Variational Inference, MCMC, High-dimensional data analysis, Tree-structured modeling, Stochastic processes.
- **Bioinformatics**: Spatial transcriptomics modeling, multi-omic integration, QIIME2, PICRUSt2, edgeR.
- **Programming**: Python (Pandas, NumPy, Scikit-learn), R (tidyverse), SLURM, MATLAB, C/C++, SQL.

Publications and Preprints

Published papers

2. **Outlier detection for multi-network data.** Dey, P., Zhang, Z., Dunson, D.B. *Bioinformatics* (2022).
1. **dame-flame: a Python package providing fast interpretable matching for causal inference.** Gupta, N.R., Orlandi, V., Chang, C.-R., Wang, T., Morucci, M., Dey, P., Howell, T.J., Sun, X., Ghosal, A., Roy, S., Rudin, C., Volfovsky, A. *Journal of Statistical Software* (2025).

Preprints and papers under review

6. **A Generalized Tangent Approximation Framework for Strongly Super-Gaussian Likelihoods.** Roy, S., Dey, P., Pati, D., Mallick, B.K. *arXiv* preprint. *Major revision (JASA, Theory and Methods)*
5. **JASPER: Joint Bayesian Analysis of Spatial Expression via Regression.** Dey, P., Guhaniyogi, R., Ni, Y., Mallick, B.K. *arXiv* preprint. *Submitted*
4. **Additive Nonparametric Regression with Spatial and Network Objects.** Guhaniyogi, R., Dey, P., Chandra, K., Scheffler, A., Mallick, B.K. *Major revision (Biometrics)*
3. **VaSST: Variational Inference for Symbolic Regression using Soft Symbolic Trees.** Roy, S., Dey, P., Mallick, B.K. *arXiv* preprint. *Submitted*
2. **Hierarchical Bayesian Operator-induced Symbolic Regression Trees for Structural Learning of Scientific Expressions.** Roy, S., Dey, P., Pati, D., Mallick, B.K. *arXiv* preprint. *Submitted*
1. **Ensembles of Mondrian Processes for Continuous Modeling of Structural Connectomes.** Dey, P., Zhang, Z., Dunson, D.B. *Submitted*

Manuscripts in preparation

1. **Joint Integrative Spatial Transcriptomics via Bayesian Modeling for Domain Recovery and Spatially Variable Gene Selection.** Dey, P., Guhaniyogi, R., Ni, Y., Mallick, B.K. *In preparation*
2. **Hierarchical Ensembles of Mondrian Processes for Simultaneous Modeling of Common and Individual Structure of connectome Data.** Dey, P., Zhang, Z., Dunson, D.B. *In preparation*
3. **Noninvasive fecal multi-omic signatures for $Apc^{S580/+}$/$Kras^{G12D/+}$ mice.** Ivanov, I., Mullens, D., Dey, P., Chung, H.C., Gaynanova, I., Ni, Y., Ufondu, A., Yang, F., Han, H., Woods, P., Goldsby, J.S., Davidson, L.A., Safe, S.H., Jayaraman, A., Chapkin, R.S. *In preparation*

4. **Diet shapes gut microbial function and indirectly influences host gene expression in infants.** Dey, P., Mullens, D., Ivanov, I., Chapkin, R., Donovan, S., et al. *In preparation*

Presentations & Conferences

6. **Invited talk:** SETCASA Annual Meeting, *Texas A&M University* *2026*
5. **Invited talk:** IISA Conference, *University of Nebraska–Lincoln* *2025*
4. **Poster:** TREC Annual Cancer Research Symposium, *Texas A&M University* *2025*
3. **Contributed talk:** NISS 2nd Annual Graduate Student Research Conference, *Online* *2022*
2. **Contributed talk:** WNAR Conference, *Online* *2022*
1. **Poster:** Statistical Methods in Imaging Conference, *Online* *2021*

Awards

3. **Rank 1** in National Eligibility Test (NET), conducted by Council of Scientific and Industrial Research (CSIR), India (2018).
2. **S.H. Aravind Gold Medal**, for outstanding performance in Bachelor of Mathematics (Hons.), ISI Bangalore (2016).
1. **KVPY Scholarship**, awarded by Department of Science and Technology, Govt. of India (2013–2018).