Pritam Dey

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Personal Profile

A statistical science student with a strong interest in building a career in data science and machine learning. I am highly motivated to learn and apply new statistical and data science techniques as well as contribute to development of such statistical models. Specifically, I am strong in creating new statistical models for data having complex structures and efficiently implementing such models in software using standard programming languages like Python and R. Currently looking for a job as a Postdoctoral Reasearcher or Associate.

Education

Duke University *Durham, NC, USA*

PhD in Statistical Science *Aug 2018 - Present*

- Research with advisor Dr. David Dunson on methodology for complex neuroscience data
- Statistical modelling and analysis of human brain structural connectomics data. Specifically developed an influence measure based outlier detector for brain networks and currently working on a fast scalable hierarchical framework for continuous connectivity modelling of the brain.

Indian Statistical Institute *Kolkata, India*

Master of Statistics *Aug 2016 - Jun 2018*

- **Notable Courses:** Statistical Inference, Regression, Large Sample Theory, Nonparametric Inference, Multivariate Statistics, Measure Theory, Statistical Computing, Time Series Analysis, Martingale Theory, Functional Analysis, Brownian Motion, Weak Convergence Theory

Indian Statistical Institute *Bangalore, India*

Bachelor of Mathematics (Hons.) *Aug 2013 - Jun 2016*

- Graduated with Distinction
- Awarded S.H. Aravind Gold Medal for excellence
- **Notable Courses:** Real and Complex Analysis, Topology, Graph Theory, Differential Geometry, Differential Topology, Differntial Equations

Research Experience

A fast scalable continuous representation framework for structural connectomics data *Durham, NC, USA*

Duke University *Oct 2021 - Present*

- Motivated by the need for an efficient and fast multi-resolution representation of the structural connectome.
- Based on Mondrian Processes by Roy and Teh (2008).
- Developed theory and a hierarchical extension of Mondrian processes for continuous connectome representation based on density estimation.
- Developed an efficient and fast implementation in Python.
- Two working papers in progress.

Outlier Detection for Multi-Network Data *Durham, NC, USA*

Duke University *Jun 2019 - Jan 2022*

- Motivated by the presence of large number of outliers in structural connectomics data.
- Created a model based outlier detection method based on an influence measure.
- Implemented this method in R and Python.

dame-flame: A Python Library Providing Fast Interpretable Matching for Causal Inference *Durham, NC, USA*

Duke University *Oct 2021 - Dec 2021*

- Python package based on a large-scale causal inference model.
- Contributed to the creation and debugging.

Teaching Experience

Duke University *Durham, NC, USA*

Teaching Assistant *Aug 2019 - Present*

- Worked as TA in several graduate level courses.
- Led labs, created assignments and helped with grading.
- 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)

Research Interests

Complex data My main interest is to develop methodology for complex data with special focus on computational efficiency.
Network Data My PhD thesis is going to be on statistical for brain network data.
Hierarchical Modelling
Bayesian Data Analysis
Causal Inference

Skills

Statistics Data Analysis (both Bayesian and Frequentist), Machine Learning, Multivariate Analysis, Stochastic Processes, Mathematical Statistics, Multivariate Time Series Analysis.
Programming Python (Pandas, NumPy, Matplotlib, Scikit-learn, etc.), R (tidyverse), MATLAB, C/C++, SQL with strong proficiency in R and Python.
Miscellaneous LaTeX(Overleaf/R Markdown), Microsoft Office, Git.
Soft Skills Time Management, Organization, Problem-solving, Documentation.

Awards and Recognition

2018 **Rank 1,** National Eligibility Test conducted by Council of Scientific and Industrial Research (CSIR) *Kolkata, India*
2016 **S. H. Aravind Gold Medal,** Outstanding Performance in Bachelor of Mathematics (Hons.) *Bangalore, India*
2013 - 2018 **Book grants,** from Indian Statistical Institute for excellent academic performance *India*
2013 - 2018 **KVPY Scholarship,** awarded by Department of Science and Technology (Govt. of India) *Kolkata, India*

Publications

Journal Articles

Outlier detection for multi-network data
Pritam Dey, Zhengwu Zhang, David B Dunson
Bioinformatics 38.16 (June 2022) pp. 4011–4018. 2022

Preprints

dame-flame: A Python Library Providing Fast Interpretable Matching for Causal Inference
Neha R. Gupta, Vittorio Orlandi, Chia-Rui Chang, Tianyu Wang, Marco Morucci, Pritam Dey, Thomas J. Howell, Xian Sun, Angikar Ghosal, Sudeepa Roy, Cynthia Rudin, Alexander Volfovsky
(2021). arXiv, 2021

Working Papers

Fast Scalable Density Estimation for Continuous Structural Connectomics
Pritam Dey, Zhengwu Zhang, David B Dunson

Hierarchical Muliple Density Estimation using Mondrian Processes
Pritam Dey, Zhengwu Zhang, David B Dunson

Talks and Posters

2022 **WNAR Conference,** Contributed Talk *Online*
2022 **2nd Annual Graduate Student Research Conference,** Contributed Talk *Online*
2021 **Statistical Methods in Imaging Conference,** Poster *Online*