Satarupa Bhattacharjee

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Employment

Pennsylvania State University — State College, PA, USA
Postdoctoral Scholar in the Department of Statistics
Advisors: Prof. Bing Li and Prof. Lingzhou Xue — 2022–present

Education

University of California, Davis — Davis, USA
Ph.D. in Statistics, Advisor: Prof. Hans-Georg Müller — 2017–2022

Indian Institute of Technology, Kanpur — Kanpur, India
M.Sc. in Statistics — 2015–2017

St. Xavier's College, Kolkata — Kolkata, India
B.Sc. in Statistics — 2012–2015

Research Interests

Statistics on non-Euclidean object valued data- developing broadly applicable statistical methods and inference for analyzing non-Euclidean data residing in abstract metric spaces, with applications in brain imaging studies, mortality and life expectancy distributions, child neurological development, traffic network analysis, and genetics data.
Functional and longitudinal data analysis, and its overlap with metric geometry- studying samples of time-varying metric space-valued data, examples being dynamic networks or distribution objects.
Reproducing kernel Hilbert spaces- developing abstract mathematical and computational methods for infinite dimensional data in connection with metric geometry and sufficient dimension reduction.
Inference for online decision-making in a contextual bandit setting- Multi-armed bandit problems for sequential decision-making.
Causal inference- in conjunction with distributional data analysis.
Nonparametric statistics, analysis of high-dimensional and geometrical data.

Accepted/ Published Projects

- Bhattacharjee, S., and Müller, H. G. (2023). Single index Fréchet regression. *(Accepted, Annals of Statistics)*. (pdf).
- Bhattacharjee, S., and Müller, H. G. (2022). Concurrent object regression. *Electronic Journal of Statistics, 16(2), 4031-4089.* (pdf)
- Dubey, P., Chen, Y., Gajardo, Á., Bhattacharjee, S., Carroll, C., Zhou, Y., and Müller, H. G. (2022). Learning delay dynamics for multivariate stochastic processes, with application to the prediction of the growth rate of COVID-19 cases in the United States. *Journal of Mathematical Analysis and Applications, 514(2), 125677.* (pdf)
- Bhattacharjee, S., Liao S., Paul, D., and Chaudhuri, S. (2021). Inference on the dynamics of COVID-19 in the USA. *Nature Scientific Reports, 12(1), 1-15.* (pdf)
- Bhattacharjee, S., Liao, S., Paul, D., and Chaudhuri, S. (2021). Taming the pandemic by doing the mundane. *In Managing Complexity and COVID-19 (pp. 62-82), Routledge.* (pdf)
- Carroll, C., Bhattacharjee, S., Chen, Y., Dubey, P., Fan, J., Gajardo, Á., Zhou, X., Müller, H. G., and Wang, J-L. (2020). Time dynamics of COVID-19. *Nature- Scientific Reports, 10(1), 21040.* (pdf)

Preprints

- Bhattacharjee, S. and Müller, H. G. (2023–). Mixed-effects modeling of longitudinal random objects. *ArXiv preprint, Under review for JASA.* (pdf)
- Bhattacharjee, S., Li, B., Xue, L. (2023-–). Nonlinear global Fréchet regression for random objects via weak conditional expectation. *ArXiv preprint, Under review for Annals of Statistics.* (pdf)

Ongoing Projects

- Bhattacharjee, S., Li, B., Xue, L. (2023-–). Causal inference on distributional data with continuous treatments.
- Arya, S., Bhattacharjee, S., and Sriperambudur, B. (2023–). Index models for contextual bandit problems.
- Zhang, Q. and Bhattacharjee, S. (2023-–). Geodesic set distribution regression.
- Bhattacharjee, S. (2023–). Residual analysis for random object regression.

Software

- fdapace: Functional Data Analysis and Empirical Dynamics (R package) downloads 91K
  Contributing author
- frechet: Statistical Analysis for Random Objects and Non-Euclidean Data (R package) downloads 12K
  Contributing author
- fdaconcur: Concurrent Regression and History Index Models for Functional Data (R package) downloads 2148
  Creator, maintainer, and contributing author
- SDRReg: Dimension Reduction and Regression Methods for High-dimensional and Complex (Non-Euclidean) Data (R package, Test version)
  Creator, maintainer, and contributing author

Scholarships and Awards

- Peter Hall Graduate Research Award, Department of Statistics, UC Davis.
  Given to one advanced Ph.D. student to recognize overall excellence in statistical research during their doctoral degree. 2022
- Excellence in Graduate Student Teaching Service Award, Department of Statistics, UC Davis.
  Recognition for overall excellence in teaching throughout graduate career. 2022
- Best Student Paper Award, Americal Statistical Association (ASA)
  Section on Nonparametric Statistics for the manuscript *"Single Index Fréchet Regression".* 2022
- Summer Graduate Student Research Award by Graduate Studies, UC Davis. 2021
- Graduate Student Travel Award, UC Davis. 2020
- Alan Fenech Outstanding Student Award, Department of Statistics, UC Davis.
  Given to graduate students for their outstanding service to the department. 2020
- Teaching Recognition Award, Department of Statistics, UC Davis.
  Excellence in graduate student teaching, either as a TA or AI. 2019,2021
- Summer Fellowship, Department of Statistics, UC Davis. 2019
- Julius Blum Award, Department of Statistics, UC Davis.
  Given to a junior Ph.D. student recognizing extraordinary academic achievements. 2018
- Special Summer Scholarship, Department of Statistics, UC Davis. 2018
- Departmental Fellowship and Graduate Assistantship, Department of Statistics, UC Davis. 2017–2022
- Ranked 12^{th} in All India Entrance Examination, Joint Admissions Test (IIT-JAM).
  Out of 62,654 candidates who appeared for the exam. 2015
- Recipient of INSPIRE Scholarship Award, Ministry of Science and Technology, Government of India for Being among the top 1% students in 12^{th} Standard Exam.
  Out of 714,144 candidates who appeared for the exam. 2011–2015

- Academic Excellence Award, Indian Institute of Technology, Kanpur, India.
  Given to students of IIT Kanpur having a CPI of 9.0 and above. 2015
- Ranked 2^{nd} in Statistics Major (undergraduate) in St. Xavier's College, Kolkata, India.
  Out of 65 *candidates.* 2012

Talks and Presentations

- Topic- contributed session presentation on "Mixed-effects modeling of longitudinal random objects" at Joint Statistical Meeting (JSM).
  Toronto, Canada. 2023
- Invited session presentation on "Concurrent object regression" at International Conference on Econometrics and Statistics (EcoSta).
  Tokyo, Japan. 2023
- Chaired Invited Session on "New Methods and Theory for the Analysis of Complex Data" at International Chinese Statistical Association (ICSA) Annual Conference.
  Ann Arbor, MI. 2023
- Invited session presentation on "Single index Fréchet regression" at International Chinese Statistical Association (ICSA) Annual Conference.
  Ann Arbor, MI. 2023
- Invited talk on "Single index Fréchet regression" at Indian Institute of Technology, Kanpur, India.
  Virtual presentation (Upcoming). 2023
- Presentations in Nonparametric Statistics and Statistical Learning (NSSL) meetings led by Dr. Bing Li and Dr. Lingzhou Xue at Penn State University. 2022–present
- Invited session presentation on "COVID-19 time dynamics: Inference and mitigation strategy" at International Indian Statistical Association Annual Conference.
  Bangalore, India. 2022
- Topic- contributed session presentation on "Single index Fréchet regression" at Joint Statistical Meeting (JSM).
  Washington D.C. 2022
- Contributed session presentation on "Inference on the dynamics of COVID-19 in the USA" at Joint Statistical Meeting (JSM).
  Held virtually 2021
- Contributed session presentation on "Concurrent object regression" at Joint Statistical Meeting (JSM).
  Held virtually. 2020
- Organized student-run seminar at the Department of Statistics, UC Davis. 2019–2020
- Seminar Presentation on "Spell check and Bayesian noisy channel model" at National Seminar on Statistics at St. Xavier's College, Kolkata, India. 2014

Teaching Experience

Instructor

Upper division undergraduate level courses, Department of Statistics, Penn State University

- STA 418 (Introduction to Probability and Stochastic Processes) Spring 2023

Associate Instructor

Upper division undergraduate level courses, Department of Statistics, UC Davis

- STA 131C (Introduction to Mathematical Statistics) Fall 2021
- STA 106 (Analysis of Variance) Fall 2019

Teaching Assistant

Graduate and under-graduate level courses, Department of Statistics, UC Davis

- STA 13 (Elementary Statistics)
- STA 108 (Regression Analysis)

- STA 145 (Bayesian Statistical Inference)
- STA 231A (Mathematical Statistics- Ph.D. level coursework)
- STA 131AB (Introduction to Mathematical Statistics)
- STA 200B (Mathematical Statistics- Masters level coursework)
- STA 106 (Analysis of Variance)

Mentoring
Department of Statistics, UC Davis

- Thesis: "Functional data analysis on the remaining life expectancy of the older population over time"
  Advised by Dr. Hans-Georg Müller. 2022
- Thesis: "Inference on the dynamics of COVID-19 in India for the state of Kerala"
  Three undergraduate students advised by Dr. Debashis Paul. 2020–2021

Referee Service

- Journal of American Statistical Association (JASA) (3)
- Annals of Statistics (2)
- Electronic Journal of Statistics (2)
- Biometrika
- Scandinavian Journal of Statistics
- Sankhya, Series A
- Scientific American

Languages

- English, Bengali (native), Hindi (proficient)
- R, Julia, Python, C, C++, LaTeX

Academic Participation

- Postdoctoral representative for Climate and Diversity Committee,
  Department of Statistics, Penn State. 2023–present
- Student representative for Educational Policy and Curriculum Committee,
  Department of Statistics, UC Davis. 2020–2022
- Literacy and teaching campaign for underprivileged children at the village Paikhala, West Bengal, organized by
  National Service Scheme, India. 2015–2017
- Organizer of the cultural committee of Prakarsho- the annual magazine of Xaverian
  Statistical Association, St. Xavier's College, Kolkata, India. 2013–2014
- Aptitude tests in English, Maths, and Science organized by University of New South Wales *participated and passed with distinction.* 2008–2010

Relevant Coursework

- **Graduate Level**
  Probability and Measure Theory, Generalized Linear Models, Advanced Machine Learning, Real Analysis, Linear Algebra and Matrix Theory, Complex Analysis, ANOVA Design and Regression, Mathematical Statistics, Time Series Analysis, Stochastic Process, Robust Statistical Inference, Probabilistic Theory of Pattern Recognition.
- **Undergraduate Level**
  Data Structure and DBMS, SQL, C++, R, Differential Equations, Numerical Analysis.