Siddharth Vishwanath

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Education

Penn State University 2017 – 2023 (Expected)
Ph.D. Candidate, Department of Statistics 3.95/4.00
Advisor: Prof. Bharath Sriperumbudur
Dissertation: "Statistical Learning for Efficient and Robust Topological Inference"

Indian Institute of Technology, Kanpur 2010 – 2015
M.Sc. (Integrated), Mathematics and Statistics 8.0/10.0
Advisor: Prof. Debasis Kundu
M.Sc. Thesis: "Bayesian Inference and Optimal Schemes for Progressive Censoring"

Honors & Awards

Student Travel Award, Geometric Data Analysis Conference, University of Chicago 2019
Mu Sigma Rho (Inductee), The National Statistics Honorary Society 2018
Proficiency Medal, Indian Institute of Technology, Kanpur 2015
Academic Excellence Award, Indian Institute of Technology, Kanpur 2015
KVPY Fellowship, Department of Science & Technology (Government of India) 2010–2015

Previous Positions

Instructor, Penn State University 2022
Research Intern, IBM Research: Artificial Intelligence 2022
Research Assistant & Consultant, Statistical Consulting Center, Penn State University 2019 – 2022
Research Assistant, Department of Statistics, Penn State University 2021
Research Assistant, Department of Statistics, Penn State University 2020
Visiting Research Student, Institute of Statistical Mathematics, Tokyo 2019
Teaching Assistant, Department of Statistics, Penn State University 2017–2018
Visiting Research Student, Institute of Statistical Mathematics, Tokyo 2018
Senior Quantitative Analyst, Goldman Sachs 2016 – 2017
Quantitative Analyst, Nomura 2015 – 2016

Research

Google Scholar ID : 7TQaHEEAAAAJ

Repelling-Attracting Hamiltonian Monte Carlo for Multimodal Sampling
Siddharth Vishwanath, Hyungsuk Tak
In Preparation. (2022)

Topological Inference for Random Dot-Product Graphs under Local Differential Privacy
Siddharth Vishwanath, Jonathan Hehir
In Preparation. (2022)

Efficient and Outlier Robust Topological Inference [Preprint], [Code]
Siddharth Vishwanath, Bharath Sriperumbudur, Kenji Fukumizu & Satoshi Kuriki
Submitted to The Foundations of Computational Mathematics. (2022)

On the Limitations of Topological Data Analysis for Statistical Inference [Preprint]
Siddharth Vishwanath, Kenji Fukumizu, Satoshi Kuriki & Bharath Sriperumbudur
Submitted to Bernoulli. (2022)

Monolith Soil Core Sampling to Develop Nitrate Testing Protocol for Manure Injection [Link]
Robert J. Meinen, Douglas B. Beegle, **Siddharth Vishwanath**, Peter J. A. Kleinman,
Louis S. Saporito, John Spargo, Heather Karsten & Justin Dillon
Soil Science Society of America Journal. Springer. (2022)

The Shape of Edge Differential Privacy [Link]
Siddharth Vishwanath, Jonathan Hehir
Theory and Practice of Differential Privacy, International Conference on Machine Learning, ICML. (2021)

Robust Persistence Diagrams using Reproducing Kernels [Link], [Slides], [Code]
Siddharth Vishwanath, Kenji Fukumizu, Satoshi Kuriki & Bharath Sriperumbudur
Advances in Neural Information Processing Systems, NeurIPS . (2020)

Bayesian Inference and Optimal Censoring Scheme under Progressive Censoring [Link]
Siddharth Vishwanath, Debasis Kundu
Advances in Reliability and System Engineering. Springer. (2017)

Talks & Presentations

Invited Talks

Stochastic Modeling and Computational Statistics Talks, Penn State [Slides] 2022
Hamiltonian Repelling Attracting Metropolis Algorithm for High Dimensional Multimodality

Center for Astrostatistics (CAst) Seminar, Penn State [Slides] 2022
Hamiltonian Repelling Attracting Metropolis Algorithm for High Dimensional Multimodality

34TH Conference on Neural Information Processing Systems, NeurIPS [Slides], [Talk] 2020
Robust Persistence Diagrams using Reproducing Kernels

Stochastic Modeling and Computational Statistics Talks, Penn State [Slides] 2020
Statistical Inference for Topological Data Analysis

Geometric and Topological Data Analysis Group, University of California, Davis 2020
Limitations of Topological Data Analysis for Statistical Inference

Contributed Presentations

Joint Statistical Meetings (JSM) [Slides] 2021
Efficient and Robust Topological Inference with Kernels

Theory & Practice of Differential Privacy, 38TH International Conference on Machine Learning [Poster] 2021
The Shape of Edge Differential Privacy

IMSI Workshop on Topological Data Analysis [Poster] 2021
Robust Persistence Diagrams using Reproducing Kernels

Joint Statistical Meetings (JSM) [Slides] 2020
Statistical Invariance of Betti Numbers in the Thermodynamic Regime

Applied Topology: Methods, Computation,and Sciences (ATMCS) Conference [Slides], [Talk] 2020
Statistical Invariance of Betti Numbers in the Thermodynamic Regime

Geometric Data Analysis Conference, University of Chicago [Poster] 2019
Statistical Invariance of Betti Numbers in the Thermodynamic Regime

Rao Prize Conference, Penn State [Poster] 2019
Statistical Invariance of Betti Numbers in the Thermodynamic Regime

Teaching

Instructor

Foundations of Mathematical Statistics (Math/Stat 319) [Course Website] Fall 2022
Introduction to Mathematical Statistics (Math/Stat 415) Spring 2018

Teaching Assistant

Introduction to Mathematical Statistics (Math/Stat 415) Fall 2017
Graduate Applied Regression Analysis (Stat 511) Fall 2019
Introduction to Probability and Random Variables (Math/Stat 414) Spring 2019
Applied Multivariate Analysis (Stat 504) Summer 2019
Nonparametrics and Statistical Learning Theory(Stat 597) Fall 2021

Service & Leadership

Professional Activities

Statistical Learning Theory Working Group @ Penn State 2018 – 2020

Co-organizer & Webmaster [Website]

Reviewing 2019 – Present

- Neural Information Processing Systems (NeurIPS)
- International Conference on Machine Learning (ICML)
- International Conference on Learning Representations (ICLR)
- Conference on Artificial Intelligence and Statistics (AISTATS)

Member 2017 – Present

American Stat. Association (ASA), Mathematical Association of America (MAA), Institute of Mathematical Statistics (IMS)

Bioinformatics Workshop, Maharani Laxmi Ammanni College, India 2016

Organized a three day session on introduction to statistical analysis for bioinformatics with hands-on experience using R

Mentoring & Student Activities

Statistics Graduate Students' Association, Penn State 2017 – Present

Graduate Mentor

- Research and professional mentoring for incoming PhD students, and served on student discussion panels
- Organized workshops on Git & version control (2022), Topological Data Analysis (2020), Tidyverse and Functional Programming in R (2018, 2019, 2020, 2021)

Students' Senate, IIT Kanpur 2013 – 2015

Finance Convener & Ungdergraduate Senator

- Managed a budget of INR 20 million which encompasses activities of all student bodies, clubs and hobby groups
- Served on the anti-ragging committee, and mentored incoming freshmen as a representative of the students' senate

Professional Experience

Research Intern, IBM Research: Artificial Intelligence 2022

- Developed methodology for robust training of generative models (e.g., GANs) using topological regularization
- Built a `Julia` library for automatic-differentiation of topological losses with ∼5x speed-up over Python counterparts
- Illustrated the benefit of the topological perspective on generative models for molecular discovery

Research Assistant & Consultant, Statistical Consulting Center, Penn State 2019 – 2022

- Conducted consultations with faculty, graduate students & industry clients with research-related statistical problems
- Worked on long-term projects with Penn State faculty on a contractual basis

Senior Quantitative Analyst, Goldman Sachs 2016 – 2017

- Enhanced the methodology for estimating the liquidity risk in Margin Loan models using a Monte-Carlo framework
- Developed an automated risk-validation platform for regulatory submissions – saving over 30 hours of work per person per quarter
- Automation strategy employed machine learning models to identify and classify anomalies in regulatory stress-tests

Quantitative Analyst, Nomura 2015 – 2016

- Reviewed theoretical assumptions, set up benchmarking tools & assessed performance for in-house risk models
- Developed an alternative framework for estimating specific counterparty credit risk in a Gaussian two-factor copula
- Enhanced methodology for computing counterparty exposure from Credit Default Swaps using a CIR++ model
- Developed an efficient method to estimate Marginal VaR for portfolios using nonparametric regression & kernel smoothing

Skills

Open Source Projects	RobustTDA.jl, Robust PDs, HaRAM.jl
Programming	Julia, R, Python, C/C++, MATLAB, SQL, HTML, CSS, LaTeX
Frameworks	Flux.jl, Turing.jl, SciML.jl, Data.Table, Tidyverse, JAX, PyTorch
Languages	English, Kannada, Hindi (Native), French (Proficient)