Medha Agarwal

medhaaga@uw.edu | medhaaga.github.io | @medhaaga | Google Scholar

Education

Aug 2026 — **PhD, Statistics**
University of Washington
Advisor: Alex Luedtke, Zaid Harchaoui
Coursework: Optimal transport & gradient flows, machine learning from big data, regression methods, statistical inference, statistical learning, measure-theoretic probability.

May 2021 — **Bachelor in Science, Mathematics and Scientific Computing**
Indian Institute of Technology Kanpur
Advisor: Dootika Vats | Minor: English Literature
Coursework: Sampling and data analysis, data structures and algorithms, stochastic processes, Bayesian statistics, probability theory, multivariate analysis.

Work Experience

Summer 2024 — **Amazon Science** — *New York City, NY*
Applied Scientist Intern
- Foundational model for probabilistic forecasting of multi-horizon and multivariate time series using convolutional neural networks based Seq2Seq architectures.

Summer 2023 — **Amazon Science** — *Bellevue, WA*
Applied Scientist Intern
- Reinforcement learning using human feedback training pipeline for foundational LLMs.
- Work featured in **Amazon Machine Learning Conference 2023**.

2021-Present — **University of Washington** — *Seattle, WA*
Predoc Research Associate
- Density estimation and generative modeling using normalizing flows.
- Optimal transport and gradient flows for explainable artificial intelligence.
- Machine learning for multi-modal wildlife sensor data - audio, video, GPS, and accelerometry.

Summer 2020 — **Duke University** — *Durham, NC*
Research Intern, Advisor: Jason Xu
- Accelerated monotonic optimization algorithms using quasi-Newton methods.
- Asymptotically valid convergence diagnostics and stopping criterion for importance sampling.

2020-2021 — **Indian Institute of Technology Kanpur** — *Kanpur, India*
Research Intern, Advisor: Dootika Vats
- Asymptotically valid autocovariance and spectral variance estimators for Markov chain Monte Carlo in the case of multimodal target distributions.

Publications

- **Medha Agarwal**, Kasim Rafiq, Ronak Mehta, Briana Abrahms, and Zaid Harchaoui. Leveraging machine learning and accelerometry to classify animal behaviours with uncertainty. 2024a
  Submitted to: Methods in Ecology and Evolution
- **Medha Agarwal**, Zaid Harchaoui, Garrett Mulcahy, and Soumik Pal. Iterated Schrödinger bridge approximation to Wasserstein gradient flows. *arXiv preprint arXiv:2406.10823*, 2024b
  Submitted to: Journal of Functional Analysis
- **Medha Agarwal** and Jason Xu. Quasi-Newton acceleration of EM and MM algorithms via Broyden's method. *Journal of Computational and Graphical Statistics*, 2023
- **Medha Agarwal**, Dootika Vats, and Víctor Elvira. A principled stopping rule for importance sampling. *Electronic Journal of Statistics*, 16(2):5570–5590, 2022
- **Medha Agarwal** and Dootika Vats. Globally centered autocovariances in MCMC. *Journal of Computational and Graphical Statistics*, 31(3):629–638, 2022
- Akash Jain, Manish Kumar, Rithvik Patibandla, Abhinav Arora, Akash K Singh, Varun Pawar, Aditya Rai,

Medha Agarwal, Priank Prasad, Vandit Sanadhya, et al. Design and development of underwater vehicle: Anahita. *arXiv preprint arXiv:1903.00494*, 2019

Work in Progress

- **Medha Agarwal**, Garrett Mulcahy, Soumik Pal, and Zaid Harchaoui. Discrete approximation of relaxed f-divergence gradient flow. 2025

Software

2024	Code for **AWD Biologging**	*[GitHub]*
2024	Code for **Schrödinger Bridge Scheme**	*[Algorithm] [GitHub]*
2023	Code for **Brenier Potential Flow**	*[GitHub]*
2020	**R package `quasiNewtonMM`**	*[GitHub]*
2020	**R package `multichainACF`**	*[Vignette] [GitHub]*

Academic Achievements and Scholarships

2024 Winner, Student Paper Competition, ASA Conference on Statistical Learning and Data Science.

2023 Finalist, Two-Sigma PhD Fellowship program.

2023 Institute of Mathematical Statistics Hannan Graduate Student Travel Award
Awarded to fund travel and registration for Bayes Comp 2023 to give an invited talk.

2022 Center for Statistics and the Social Sciences Travel Award for BayesComp 2023

2022 Institute for Foundations of Data Science Scholarship
Supported by the NSF Transdisciplinary Research in Principles of Data Science (TRIPODS) program

2021 Proficiency Medal, Department of Mathematics and Statistics, IIT Kanpur
Awarded for the best academic performance among graduating students in each department

2017 Academic Excellence Award-Dr. Sangeeta Goel Memorial Award at IIT Kanpur
Awarded to first-year female undergraduate student with highest All India Rank in Indian Institute of Technology Joint Entrance Examination.

2016 Certificate of Merit (Statewise Top 1 %) in National Standard Examination in Chemistry

2015 Kishore Vigyan Protsahan Yojana fellow with All India Rank 212
National Program of Fellowship in Basic Sciences funded by the Government of India

2015 National Talent Search Examination scholar, Government of India
National level scholarship program by Govt. of India.

Talks and Workshops

Jul 2026	**Wasserstein Gradient Flows in Math and Machine Learning Workshop** Banff International Research Station - invited attendee	*Banff, Canada*
Jan 2025	**2025 Joint Mathematics Meetings** Mathematics of Adversarial, Interpretable, and Explainable AI - invited session speaker	*Seattle, WA*
Nov 2024	**American Statistical Association Conference on Statistical Learning & Data Science** - poster presentation	*Newport Beach, CA*
Oct 2024	**SIAM Conference on Mathematics of Data Science** - poster presentation	*Atlanta, GA*
Oct 2023	**4th Biennial Meeting of SIAM Pacific Northwest Section** - contributed talk	*Bellingham, WA*
Mar 2023	**Bayes Comp** - invited session speaker on MCMC diagnostics	*Levi, Finland*
Aug 2022	**Simons Institute Deep Learning Theory Workshop**	*Berkeley, CA*
Aug 2020	**14th International Conference in Monte Carlo & Quasi-Monte Carlo Methods in Scientific Computing**	*Oxford, England*
Jul 2020	**noRth 2020 - a virtual conference for R users** - scholarship recipient	*Minneapolis, MN*

Skills

Leadership	Leader, Normalizing flows working group (2022-23)
Programming	Python, R, MATLAB, SQL
Tools/Framework	PyTorch, JAX, Tensorflow, LaTeX