Medha Agarwal

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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** APPLIED SCIENTIST INTERN	*New York City, NY*

- Foundational model for probabilistic forecasting of multi-horizon and multivariate time series using convolutional neural networks based Seq2Seq architectures.

SUMMER 2023	**Amazon Science** APPLIED SCIENTIST INTERN	*Bellevue, WA*

- Reinforcement learning using human feedback training pipeline for foundational LLMs.
- Work featured in **Amazon Machine Learning Conference 2023**.

2021-PRESENT	**University of Washington** PREDOC RESEARCH ASSOCIATE	*Seattle, WA*

- 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** RESEARCH INTERN, Advisor: Jason Xu	*Durham, NC*

- 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** RESEARCH INTERN, Advisor: Dootika Vats	*Kanpur, India*

- 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. *bioRxiv*, pages 2024–12, 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. Relaxed information divergence gradient flow. 2025
  Will be submitted to ICML 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 2025	**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