Dootika Vats

Curriculum Vitae Last Updated: July 24, 2024 Room 580, Faculty Building IIT Kanpur, UP 208016 ☎ +91 512 259 2076 ⊠ dootika@iitk.ac.in ℃ http://dvats.github.io/ Date of Birth: February 1990

Academic Positions

- July 2023 Associate Professor, Department of Mathematics and Statistics, IIT Kanpur.
- July 2019 Assistant Professor, Department of Mathematics and Statistics, IIT Kanpur.
- June 2023

Mar 2017 - NSF Postdoctoral Fellow,

Jul 2019 University of Warwick, England (mentor: Professor Gareth Roberts) University of California, Riverside (mentor: Professor James Flegal; May - July 2019).

Education

- Feb 2017 **PhD, Statistics**, The University of Minnesota, Twin-Cities, USA. Advisor: Professor Galin Jones
- Nov 2016 **MS**, **Statistics**, The University of Minnesota, Twin-Cities, USA.
- May 2012 MS, Statistics, Rutgers University, New Brunswick, USA.
- May 2010 **BA(honors), Mathematics**, University of Delhi, Lady Shri Ram College, India.

Research Interests

Markov chain Monte Carlo, Importance Sampling, Bayesian computation, variable selection, Bernoulli factories.

Publications

<u>2024</u>

16. <u>Banerjee, A.^s</u>, Vats, D., Multivariate strong invariance principles in Markov chain Monte Carlo, <u>Electronic Journal of Statistics</u>, to appear, arXiv.

<u>2023</u>

15. <u>Agrawal, S.^s</u>, **Vats, D.**, Łatusyński, K., Roberts, G. O., Optimal Scaling of MCMC Beyond Metropolis, <u>Advances in Applied Probability</u>, 55:492-509.

2022

- 14. Agarwal, M.^s, Vats, D., Elvira, V., A principled stopping rule for importance sampling, *Electronic Journal of Statistics*, 16:5570-5590.
- Zhou, Q., Yang, J., Vats, D., Roberts, G. O., Rosenthal, J. S., Dimension-free mixing for highdimensional Bayesian variable selection, *Journal of the Royal Statistical Society: Series B*, 84:1751-1784.
- Agarwal, M.^s, Vats, D., Globally-centered autocovariances in MCMC Journal of Computational and Graphical Statistics, 31:629-638.
- 11. Vats, D., Flegal, J.M., Lugsail lag windows for estimating time-average covariance matrices, <u>Biometrika</u>, 109:735-750.
- Vats, D., Gonçalves, F., Łatusyński, K., Roberts, G. O., Efficient Bernoulli Factory MCMC for intractable posteriors, <u>Biometrika</u>, 109:369-385.

9. Liu, Y., Vats, D., Flegal, J.M., Batch size selection for variance estimators in MCMC, Methodology and Computing in Applied Probability, 24:65-93.

2021

- 8. Vats, D., Jones, G.L., Invited Discussion: "Rank-Normalization, Folding, and Localization: An Improved \hat{R} for Assessing Convergence of MCMC by Vehtari et al.", <u>Bayesian Analysis</u>, (link), 2021.
- Vats, D., Knudson, C., Revisiting the Gelman-Rubin Diagnostic, <u>Statistical Science</u>, 36:518-529, 2021.

2020

- 6. Robertson, N., Flegal, J.M., Vats, D., Jones, G.L., Assessing and visualizing simultaneous simulation error, *Journal of Computational and Graphical Statistics*, 30:324-334, 2020.
- 5. Vats, D., Jones, G.L., Comment: "Unbiased Markov chain Monte Carlo with couplings", Journal of the Royal Society Statistical Society, Series B, (link), 2020.
- 4. Vats, D., Robertson, N., Flegal, J.M., Jones, G.L., Analyzing Markov Chain Monte Carlo Output, WIREs Computational Statistics, 12:e1501, 2020.

2017-2019

- Vats, D., Flegal, J.M., Jones, G.L., Multivariate Output Analysis for Markov Chain Monte Carlo, <u>Biometrika</u>, 106:321-337, 2019.
- Vats, D., Flegal, J.M., Jones, G.L., Strong Consistency of Multivariate Spectral Variance Estimators in Markov Chain Monte Carlo, <u>Bernoulli</u>, 24:1860-1909, 2018.
- 1. Vats, D., Geometric Ergodicity of Gibbs Samplers in Bayesian Penalized Regression Models, *Electronic Journal of Statistics*, 11:4033-4064, 2017.

Preprints

- Submitted Banerjee A.^s, Vats, D., Efficient Multivariate Initial Sequence Estimators for MCMC, arXiv.
- Submitted Singh R.^s, Shukla A.^s, Vats, D., On the Utility of Equal Batch Sizes for Inference in Stochastic Gradient Descent, arXiv.
- Submitted Douc, R., Jacob, P. E., Lee, A., Vats, D., Solving the Poisson equation using coupled Markov chains, arXiv.
- Submitted Gupta, K.^s, Vats, D., Estimating Monte Carlo variance from multiple Markov chains, arXiv.

Book Chapters

2020 Vats, D. Flegal, J.M., Jones, G.L., Monte Carlo simulation: Are we there yet?, Handbook of Computational Statistics and Data Science, Wiley.

Technical Reports

- 2022 Vats, D., Acosta F., Huber, Mark L., Jones, Galin L., Understanding Linchpin Variables in Markov Chain Monte Carlo, arXiv.
- 2021 <u>Gupta, K.^s</u>, Vats, D., Chatterjee, C., Bayesian equation selection on sparse data for discovery of stochastic dynamical systems, arXiv.

^sstudent author

Book Reviews

2019 Vats, D., Simulation and the Monte Carlo Method, 3rd ed. by Reuven Y. Rubinstein and Dirk P. Kroese, Journal of the American Statistical Association, DOI.

PhD Supervision

- 2020 Arka Banerjee.
- 2021 Apratim Shukla.
- 2022 Arghya Mukherjee, co-supervised with Arnab Hazra.

Grants

- 2023-2024 Rice-IITK Strategic Collaborative Grant, INR 15,00,000, Uncertainty Quantification: Leveraging Synergy between Optimization and Sampling, Co-PI: Eric Chi, Rice University.
- 2023-2024 NBHM Department of Atomic Energy, INR 2,75,000, Attending ICIAM 2023.
 - 2022 Google India Research Award, \approx *INR 16,00,000*, "Towards reliable and robust ML: Estimating Variability in Stochastic Gradient Descent".
- 2021-2024 SERB POWER Grant, *INR 28,17,892*, "Estimating high-dimensional covariance matrices in Markov chain Monte Carlo".
- 2020-2021 SERB MATRICS Special call, *INR 5,50,000*, "Simulating with confidence: Accurate estimation in the study of COVID-19".

• Awards and Honors

- 2024-27 Associate of the Indian Academy of Sciences
 - 2024 Speaker, Indian Women and Mathematics' Visitor Programme, giving semi-popular talks on topics building on undergraduate mathematics in non-metro areas
 - 2023 Sushila and Kantilal Mehta Award, IIT Kanpur, for motivating and encouraging students to pursue pure mathematics through their teaching and research
- 2023-26 Prof. R. N. Biswas Young Faculty Fellowship in Teaching Excellence, IIT Kanpur.
 - 2022 Google India Research Award.
 - 2022 Sushila and Kantilal Mehta Award, IIT Kanpur, for motivating and encouraging students to pursue pure mathematics through their teaching and research
 - 2021 Blackwell-Rosenbluth Award, j-ISBA recognizing outstanding junior Bayesian researchers for the overall contribution to the field and to the community
 - 2016 Student Paper Competition Winner, ASA's Section on Bayesian Statistical Science
 - 2015 Student Paper Competition Winner, International Indian Statistical Association
 - 2016 Director's Award, awarded for outstanding service to the School of Statistics
- 2016–2017 Louise T. Dosdall Fellowship, Minnesota endowed fellowship for women in STEM
- 2015–2016 School of Statistics Alumni Fellowship, Minnesota awarded to an outstanding student
 - 2014 Bernard W. Lindgren Graduate Student Teaching Award, Minnesota for excellence in teaching

Invited Talks

Please find a list of talks here.

R Software

- Maintainer SimTools, Vats, D., Flegal, J. M., Jones, G. L., Jalori, G..
- Maintainer mcmcse, Flegal, J.M., Hughes, J., Vats, D., Dai, N.. supported by Google Summer of Code 2015

Contributor stableGR, Knudson, C., Vats, D..

Contributor multichainACF, Agarwal, M., Vats, D..

Contributor **qbld**, Agarwal, A., **Vats**, **D**.. supported by Google Summer of Code 2020

Teaching

Indian Institute of Technology Kanpur

MTH210a - Statistical Computing.

MTH208a - Data Science Lab 1.

MTH516a - Nonparametric Statistics.

MTH707a - Markov Chain Monte Carlo.

MTH511a - Statistical Simulation and Data Analysis.

University of Minnesota

- Spring 2015 Lead instructor, STAT 3011 Introduction to Statistical Analysis.
- 2012–2015 Teaching Assistant, for undergrad and grad statistics courses.
- Sum 2013 Resource Instructor, College of Science and Engineering, New Grad Student Orientation. Rutgers University
- 2011–2012 Part Time Lecturer, Calculus and pre-calculus.
 - Fall 2010 Grader, Introduction to Mathematical Reasoning.

Professional Service

IIT Kanpur

- 2022- Senate Nominee, Senate Library Committee.
- 2020-22 Mess Warden, Hall 6.
- 2020-22 Senate Nominee, Senate Undergraduate Committee.
- 2020-21 Member, Core Curriculum Committee. Editorial Service
- Aug 2022 Associate Editor, Journal of Computational and Graphical Statistics.
- May 2022 Associate Editor, Sankhya Series B.

Statistical Associations

- Jan 2022 Program chair, Section on Bayesian Computing, ISBA.
- 2021-2022 Elected Member of Program Committee-Asia Representative, Caucus for Women in Statistics.
 - Summer Mentor, R Project for Statistical Computing, Google Summer of Code, 2020,2021.
 - 2018,19 Member of Review Panel, American Statistical Association's Section on Bayesian Statistical Sciences' (SBSS) Student paper competition.

Workshops and Conferences

- Mar 2023 Scientific Program Committee member, BayesComp 2023, Levi, Finland.
- Dec 2022 Scientific Program Committee member, 2022 IISA International Conference on Statistics, Bangalore, India.
- July 2021 Program committee member, useR! 2021, Virtual.
- 2021,22,23 Co-organizer, Summer School for Women in Mathematics and Statistics, ICTS.
- Dec 2017 Scientific Program Committee member, 2017 IISA International Conference on Statistics, Hyderabad, India.

University of Warwick

- 2017-2019 Co-organizer, Algorithms & Computationally Intensive Inference Seminar Series. School of Statistics, University of Minnesota
- Sum 2016 Curriculum Co-organizer and Convener, Teaching Assistant Training.
- Spring 2016 Graduate Student Representative, Search Committee for New Faculty.
- Spring 2016 Organizer, Student Talks Seminar Series.