Pratik Nag

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https://scholar.google.com/citations?user=rMB6VwYAAAAJ

Field of Research

My expertise is in spatial statistics and machine learning, and my research is focused on developing advanced statistical methods for large-scale environmental data analysis, aligning with UN SDGs 13 (Climate Action).

Awards, Fellowships

2024	**Al-Kindi Student Research Award**, King Abdullah University of Science and Technology	*$ 1000*
2023	**KAUST Competition on Spatial Statistics for Large Datasets: Sub-comp 1b and 2a**, King Abdullah University of Science and Technology	*Winner*
2022	**CEMSE Dean's List Award**, King Abdullah University of Science and Technology	*$ 2,500*
2022	**KAUST Competition on Spatial Statistics for Large Datasets, sub-comp 2a and 2b**, King Abdullah University of Science and Technology	*Winner*

Career Summary

2024 - now	**Research Fellow**, Computational Statistics, University of Wollongong, Australia
2020 - 2024	**PhD Student**, Statistics, King Abdullah University of Science and Technology
2019-2020	**Data Science Specialist**, General Electric Healthcare

Publication Summary

In my research field, first and corresponding authorship are highly valued. Out of my 7 peer-reviewed articles (57 citations, H-index 4), I hold the following positions: (i) first author on 4 papers; (ii) joint corresponding author on 1 paper; and (iii) middle author on 2 papers. I have also played an active role in the development of the large-scale spatial statistics software *ExaGeoStat*.

PUBLISHED

Pratik Nag, Ying Sun, Brian J Reich. *Bivariate DeepKriging for Computationally Efficient Spatial Interpolation of Large-scale Wind Fields*, Technometrics (Jan, 2025), 1–12. https://doi.org/10.1080/00401706.2025.2453197. (Developed a bivariate extension of DeepKriging, along with a novel data-driven methodology for prediction interval computation. Served as first author with a 98% contribution.)

Pratik Nag, Sameh Abdulah, Yiping Hong, Ghulam Qadir, Ying Sun, Marc G. Genton. *Efficient Large-scale Nonstationary Spatial Covariance function estimation using Convolutional Neural Networks*, Journal of Computational and Graphical Statistics (JCGS) (Sep, 2024), 1-22, https://doi.org/10.1080/10618600.2024.2402277. (Developed a large-scale exact implementation of the nonstationary Matérn kernel using neural networks and high-performance computing. Served as first author with a 95% contribution.)

Arnab Hazra, **Pratik Nag**, Rishikesh Yadav, Ying Sun. *Exploring the Efficacy of Statistical and Deep Learning Methods for Large Spatial Datasets: A Case Study*, JABES (2024). https://doi.org/10.1007/s13253-024-00602-4. (Conducted a comparative study of several benchmarking deep learning and statistical methodologies for large-scale spatial process modeling. Joint first author with a 45% contribution.)

Pratik Nag, Ying Sun, Brian J Reich. *Spatio-temporal DeepKriging for interpolation and probabilistic forecasting*, Spatial Statistics (Oct, 2023), volume. 57, 100773, DOI 10.1016/j.spasta.2023.100773. (Developed a deep learning framework for interpolation and forecasting of complex large-scale spatio-temporal processes with associated prediction uncertainty. First author with a 98% contribution.)

Qinglei Cao, Sameh Abdulah, Rabab Alomairy, Yu Pei, **Pratik Nag**, George Bosilca, Jack Dongarra et al. *Reshaping geostatistical modeling and prediction for extreme-scale environmental applications.* In 2022 SC22: International Conference for High Performance Computing, Networking, Storage and Analysis (SC), pp. 13-24. IEEE Computer Society, 2022. (Large-scale space-time process modeling using a spatio-temporal Matérn kernel, incorporating linear algebra approximations for efficient and high-performance computation of covariance functions. Finalist for the Gordon Bell Prize. Middle author with 18% contribution, focusing on the implementation and execution of the space-time Matérn kernel within the HPC software *ExaGeoStat*.)

Sameh Abdulah, Faten Alamri, **Pratik Nag**, Ying Sun, Hatem Ltaief, David E. Keyes, Marc G. Genton. *The Second Competition on Spatial Statistics for Large Datasets*, J. data sci. 20(2022), no. 4, 439-460, DOI 10.6339/22-JDS1076. (Middle author with 30% contribution, primarily responsible for generating nonstationary spatial datasets using various mechanisms for the competition.)

In Review

Pratik Nag. *Unrolled Creative Adversarial Network For Generating Novel Musical Pieces.* arXiv preprint arXiv:2501.00452 (Dec, 2024).

In Prep

Pratik Nag, Andrew Zammit Mangion, Ying Sun. *Normalizing flows for flexible spatial process modeling*.

Pratik Nag, Andrew Zammit Mangion, Noel Cressie, Sumeetpal Singh. *Spatio-Temporal Modeling with Fourier Neural Operators*.

Junyu Chen, **Pratik Nag**[*], Huxia Judy-Wang, Ying Sun. *Deep Indicator Kriging*. (*PhD student mentoring during my postdoctoral collaboration.)

Presentations

Invited Presentations

Pratik Nag. Feb 2025. DeepKriging for Large-Scale Complex Spatial and Spatio-Temporal Processes. Joint Research Centre, European Commission: Ispra, Italy

Contributed Presentations

Pratik Nag, Ying Sun, Brian J Reich. August 2023. Spatio-temporal DeepKriging for interpolation and probabilistic forecasting. JSM 2023: Toronto, Ontario. Canda

Pratik Nag, Sameh Abdulah, Yiping Hong, Ghulam Qadir, Ying Sun, Marc G. Genton. August 2022. Efficient Large-scale Nonstationary Spatial Covariance function estimation using Convolutional Neural Networks. JSM 2022: Washington, DC. USA

Pratik Nag, Ying Sun, Brian J Reich. Dec 2021. Bivariate DeepKriging for Large-scale Spatial Interpolation of Wind Fields. CMStatistics 2021: King's College, London, United Kingdom.

Teaching Experience

Fall 2025	**STAT202: Statistical Inference and Introduction to Model Building**, Lectureship	*University of Wollongong*
Fall 2023	**STAT 210/MOI: Statistics and Machine learning with Python**, Recitation and teaching assistantship to Ministry of interior students	*KAUST*
Fall 2022	**STAT 210: Statistics and data analysis with R**, Teaching Assistant	*KAUST*

Supervision & Mentorship

April,2025-	**Junyu Chen**, PhD student, George Washington University	*Research mentorship*

Outreach & Professional Development

SERVICE AND OUTREACH

2023 **KAUST ASA student chapter**, Strategic advisor
2022 **KAUST ASA student chapter**, Web master

PROFESSIONAL MEMBERSHIPS

Member of American Statistical Association
Member of Statistical Society of Australia