Yunshan Duan

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EMPLOYMENT

Postdoctoral Fellow

Department of Applied Mathematics and Statistics, Johns Hopkins University — Aug 2025 - Present

PI: Prof. Yanxun Xu

EDUCATION

University of Texas at Austin — Austin

Ph.D. in Statistics — Jul 2025

Advisor: Prof. Peter Müller

Fudan University — Shanghai

B.S. in Mathematics and Applied Mathematics — Jun 2021

RESEARCH INTERESTS

Methodology: Bayesian nonparametrics; Dependent random partitions; Gaussian Processes; Statistical Machine Learning; Sequential decision making.

Application: Single-cell and spatial transcriptomics; Clinical trial design and analysis.

PUBLICATIONS

- **Duan, Y.,** Guo, S., Yan, H., Wang, W., Müller, P. (2025+). Spatially aligned random partition model on spatial transcriptomics data. (*Submitted*)
- **Duan, Y.**, Guo, S., Wang, W., & Müller, P. (2024). Immune profiling among colorectal cancer subtypes using dependent mixture models. *Journal of the American Statistical Association*, 1-23. (Winner of 2024 ASA-SBSS student paper competition)
- **Duan, Y.,** & Parast, L. (2024). Flexible evaluation of surrogate markers with Bayesian model averaging. *Statistics in medicine*, 43(4), 774-792.
- **Duan, Y.,** Yuan, S., Ji, Y., & Müller, P. (2024). A unified decision framework for phase I dose-finding designs. Statistics in Biosciences, 16(1), 69-85.
- Tec, M., **Duan, Y.,** & Müller, P. (2023). A comparative tutorial of Bayesian sequential design and reinforcement learning. *The American Statistician*, 77(2), 223-233.
- **Duan, Y.,** Müller, P., & Ji, Y. (2023). Comment: Response-adaptive randomization in clinical trials: From myths to practical considerations. *Statistical Science*, 38(2), 212-215.
- Müller, P., **Duan, Y.**, & Garcia Tec, M. (2022). Simulation based sequential design. *Pharmaceutical Statistics*, 21(4), 729-739.
- **Duan, Y.**, Wang, S. J., & Ji, Y. (2021). Hi3+3: A model-assisted dose-finding design borrowing historical data. *Contemporary Clinical Trials*, 106437.

BOOKS

- Schwob, M., **Duan, Y.**, Cantoni, B., Flores-López, B., & Walker S. (2025). *Exercises in statistical reasoning*, Chapman & Hall/CRC.
- Zhuo, J., **Duan, Y.**, & Jiang X. (2022). *MATLAB operation research*, Tsinghua University Press.

WORKING PAPERS

- **Duan, Y.**, Williamson, S. (2025+). Self-supervised learning with Gaussian Processes.
- **Duan, Y.,** Guo, X., Zhong, W. (2025+). Synthesis of multiple endpoints by Bayesian multi-state modeling in oncology trials.
- **Duan, Y.*,** Day, A.*, Williamson, S. (2025+). Bayesian optimization with uncertain inputs.

* Equal contribution.

TEACHING EXPERIENCE

University of Texas at Austin Sep 2021 – May 2022

Teaching Assistant

- SDS 320E Elements of Statistics, 21 Fall, 24 Spring.
- SDS 322E Elements of Data Science, 22 Spring.

AWARDS

- University Graduate continuing fellowship 2024-2025
- Second Place Poster Award of 2025 Best of Statistical Science Workshop Apr 2025
- Winner of 2024 ASA-SBSS student paper competition Aug 2024
- Winner of the 5th Stat4Onc Annual Symposium poster competition May 2022
- Travel Funding Award May 2022; May 2023
- Freshman scholarship and Scholarship of Fudan University Dec 2017; Oct 2018; Oct 2019

GRANTS

- Innovation in cancer informatics, "*Spatial transcriptomic profiling of the tumor microenvironment to reveal the etiology of young-onset colorectal cancer*". Role: P.I., (with Singh, M., Müller, P., Nancy, Y.). Unfunded.

PRESENTATIONS

- Poster session, "Spatially aligned random partitions on spatial transcriptomics data", *2025 Best of Statistical Science Workshop*, Apr 2025.
- Invited presentation, "Self-supervised learning with Gaussian Processes", *Frontiers of Bayesian Inference and Data Science*, Sep 2024.
- Student paper competition presentation, "Immune profiling among Colorectal Cancer subtypes using Dependent Mixture Model," *Joint Statistical Meeting*, Aug 2024.
- Invited presentation, "Spatially aligned random partitions for tumor-immune interaction", *Interpretable Inference via Principled BNP Approaches in Biomedical Research and Beyond*, Jul 2024.
- Poster session, "Immune profiling among Colorectal Cancer subtypes using Dependent Mixture Model," *2023 Leading Edge of Cancer Research Symposium*, Nov 2023.

- Invited presentation, "Flexible evaluation of surrogate markers with Bayesian Model Averaging," *2023 WNAR/IMS Annual Meeting*, June 2023.
- Poster session, "Spatial clustering with random partitions on ovarian cancer data," *Women in Machine Learning*, Nov 2022.
- Poster session, "Immune profiling among Colorectal Cancer subtypes using Dependent Mixture Model," *Conference on advances in Data Science*, Oct 2022.
- Contributed presentation, "A Unified Decision Framework for Phase I Dose-Finding Designs," *New England Statistical Society Symposium*, May 2022.
- Poster session, "A Unified Decision Framework for Phase I Dose-Finding Designs," *Stat4Onc symposium*, May 2022.
- Contributed presentation, "A Unified Decision Framework for Phase I Dose-Finding Designs," *Society for Clinical Trials Annual Meeting*, April 2022.

SOFTWARE

- **SASC**: R implementation of dependent mixture models for immune profiling among colorectal cancer subtypes.
- **SurrogateBMA**: R package for flexible evaluation of surrogate markers with Bayesian model averaging.

PROFESSIONAL SERVICE

- **Journal reviewer** for Statistical Science, Biostatistics, The New England Journal of Statistics in Data Science.

WORKING EXPERIENCE

University of Texas at Austin June 2022 – May 2023

Graduate Research Assistant

- Topic: Bayesian optimization with uncertainty inputs, 23 Fall.
- Topic: Flexible evaluation of surrogate markers with Bayesian Model Averaging, 22 Fall & 23 Spring.
- Topic: Immune profiling among Colorectal Cancer subtypes using Dependent Mixture Model, 22 Summer.

Pfizer May 2023 – Aug 2023

Biostatistician Intern

- Investigated synthesis of multiple endpoints in oncology trials using Bayesian multi-state models.
- Developed a Bayesian model allowing for joint inference of overall survival, response, and progression-free survival.

Cytel Aug 2020 – Aug 2021

Biostatistician Intern

- Developed statistical engines for SaaS using C++ and R. Implemented trial designs, debugged, and validated results.
- Developed potential R package/ R shiny page for novel Bayesian clinical trial designs.
- Conducted clinical trial consulting. Provided clinical trials conducting suggestions, simulation results, edited protocols.

SKILLS

- **Language**: Chinese (native), English (fluent).
- **Programming**: Proficient in R, Python (PyTorch), MATLAB, C++.