Rachel Longjohn

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Summary

Research data scientist with a strong foundation in statistics and AI/ML, passionate about developing and applying safe and impactful real-world solutions. Proven track record of advancing and integrating state-of-the-art research in both academic/government research labs and industry.

Education

Ph.D. in Statistics   Expected 2025
University of California, Irvine (Advisor: Padhraic Smyth)

M.S. in Statistics   Jun 2021
University of California, Irvine *(GPA: 4.00/4.00)*

B.S. in Applied and Computational Mathematics   May 2019
University of Southern California *(GPA: 3.96/4.00)*

Work Experience

Graduate Student Researcher   Jun 2020 - Present
University of California, Irvine

- Investigating statistical approaches for LLM testing and evaluation that leverage techniques from Bayesian statistics for uncertainty quantification.
- Developed probabilistic models for categorical, sequential, and text data in digital forensics applications.

Statistical Sciences Intern   Jun 2023 - Sep 2023
Los Alamos National Laboratory

- Investigated statistical approaches for the testing and evaluation of foundation models for large-scale multimodal data, including image, text, and seismic data.
- Developed methods of uncertainty quantification for aggregate ML evaluation metrics that support a better understanding of model performance for practical use.

Machine Learning and Data Science Intern   May 2018 - Aug 2019
Obsidian Security

- Constructed generalizable data representations for modeling cybersecurity insights in enterprise SaaS environments; interfaced with data from a variety of APIs, including Box, DropBox, GSuite, AWS, Office 365, Slack, and Salesforce.
- Engineered a property-based code testing suite in Python for testing ETL pipelines.

Skills

Languages: Python, R, SQL

Software packages: PyTorch, scikit-learn, pandas, matplotlib, Tidyverse, Stan

Tools: git, quarto

Publications

Longjohn, R., Nelson, K., & Smyth, P. (2025). Score-based likelihood ratios using authorship embeddings. (Under Review).

Longjohn*, R., Kelly*, M., Singh, S., & Smyth, P. (2024). Benchmark data repositories for better benchmarking. *NeurIPS*. https://arxiv.org/abs/2410.24100

Longjohn*, R., Gopalan*, G., & Casleton, E. (2024). Statistical uncertainty quantification for aggregate task-performance metrics in ML benchmarks. *NeurIPS Workshop on Statistical Frontiers in LLMs and Foundation Models.* https://arxiv.org/abs/2501.04234

Longjohn, R., & Smyth, P. (2024). Likelihood ratios for changepoints in categorical event data with applications in digital forensics. *Journal of Forensic Sciences.* https://doi.org/10.1111/1556-4029.15512

Longjohn, R., Smyth, P., & Stern, H. S. (2022). Likelihood ratios for categorical count data with applications in digital forensics. *Law, Probability and Risk.* https://doi.org/10.1093/lpr/mgac016

Service and Teaching

Workshop Organizer The Future of Machine Learning Data Practices and Repositories, ICLR	2025
Data Curator and Librarian UCI Machine Learning Repository	2020-25
Reviewer NeurIPS, Datasets and Benchmarks	2022-24
Teaching Assistant Inferential Statistics (2019, 2024), Data Analysis (2018-19)	2018-24
Editor-in-Chief, Viterbi Conversations in Ethics University of Southern California	2018-19

Awards and Fellowships

University of California, Irvine

· Rose Hill Foundation Science and Engineering Fellowship	2024
· Robert Newcomb Graduate Award in Statistics, Honorable Mention	2020

University of Southern California

· Summa Cum Laude	2019
· Phi Beta Kappa Honor Society	2017-19
· Dean's List	2015-19

Talks and Presentations

Longjohn*, R., Gopalan*, G., & Casleton, E. (2024). Statistical uncertainty quantification for aggregate task-performance metrics in ML benchmarks. *NeurIPS Workshop on Statistical Frontiers in LLMs and Foundation Models.* https://arxiv.org/abs/2501.04234

Longjohn, R., & Smyth, P. (2023a). Bayes factors for the existence of changepoints in categorical sequences within digital forensics. *Joint Statistical Meetings.*

Longjohn, R., & Smyth, P. (2023b). A likelihood ratio approach for detecting behavioral changes in device usage over time. *Annual Meeting of the American Academy of Forensic Sciences.*

Longjohn, R., & Smyth, P. (2022b). Tutorial on likelihood ratios with applications in digital forensics. *NIST Center for Statistics and Applications in Forensic Evidence Summer Webinar Series.*

Longjohn, R., & Smyth, P. (2022a). Likelihood ratios for categorical evidence with applications to digital forensics. *Joint Statistical Meetings.*

Longjohn, R., Smyth, P., & Stern, H. (2022). Likelihood ratios for categorical evidence with applications in digital evidence. *Annual Meeting of the American Academy of Forensic Sciences.*