Michael Hellstern

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SUMMARY OF QUALIFICATIONS

- **Experience**: A Ph.D. statistician with over 7 years of experience specializing in the development and application of novel machine learning and statistical methodologies.
- **Research Lead**: Proven track record of leading end-to-end research, from theoretical problem formulation to scalable, high-performance implementation in Python (PyTorch), R, and C++.
- **Research Innovation**: Core expertise includes developing novel deep learning frameworks for dynamic models and change-point detection, creating new time series methods that improve forecast accuracy, and engineering computationally efficient inference procedures for high-dimensional network analysis.
- **Technical Skills**: Advanced knowledge of Python and PyTorch for machine learning and GPU acceleration, SQL for database queries and R, C++, and SAS for advanced statistical analyses.
- **Collaboration**: Extensive experience collaborating with clients and communicating complex statistical concepts clearly and effectively to non-expert stakeholders.

EDUCATION

Ph.D. in Biostatistics, University of Washington   *Seattle, WA*
Thesis: Methods for Time Series Network Analyses (advised by Ali Shojaie)   *Sep 2020 - Aug 2025*

M.S. in Statistics, University of Washington   *Seattle, WA*
     Jun 2018 - Aug 2020

B.A. in Economics, Williams College   *Williamstown, MA*
Honors Thesis: Fatal attraction: health care agglomeration and its consequences   *Sep 2011 - Jun 2015*
(advised by Stephen Sheppard)

EXPERIENCE

University of Washington   *Seattle, WA*
RESEARCH EXPERIENCE   *Jun 2018 - Present*

- Initiated and led conceptualization and development of an end-to-end, model-agnostic, framework to jointly learn parameters of deep learning models and detect parameter changes. Built scalable PyTorch pipeline, including processing of simulation and COVID-19 data. Leveraged GPU acceleration on a high-performance cluster.
- Improved forecast accuracy in predicting COVID-19 outcomes by over 20% by developing a new order selection method in Vector Autoregressive models.
- Developed a computationally efficient inference procedure for high-dimensional networks enabling real-time analysis. Used to analyze dynamic brain networks under external stimulation aiding in treatment of neurodegenerative disorders.

STATISTICAL CONSULTING   *Fall 2022*

- Provided guidance on statistical analysis and programming for clients across diverse domains including pediatrics, nutrition sciences, and forestry to translate real-world research questions into statistical and analytical solutions, explained in clear, accessible terms.

RESEARCH ASSISTANT   *Jun 2018 - Jun 2019*

- Developed and maintain the `netgsa` R package for network-based gene set analysis. Achieved major improvements in computational efficiency - up to 40x faster - and no loss in statistical power through unsupervised clustering and C++ integration.

Analysis Group   *Boston, MA*
SENIOR ANALYST   *Jul 2015 - May 2018*

- Collaborated with clients to conduct statistical analyses of large-scale data including health insurance claims and EMR databases. Performed database queries in SQL and statistical analyses in SAS and R. Collaborations resulted in 10 publications.
- Statistical analyses included causal inference methods for observational data such as IPTW and matching.

Publications / In preparation

[1] **Hellstern M**, Shojaie A. "Dynamic Deep Learning for Change-point Detection". In preparation. *Draft available on request.*

[2] **Hellstern M**, Shojaie A. "Order Selection in Vector Autoregression by Mean Square Information Criteria". In preparation. *Draft available on request.*

[3] **Hellstern M**, Kim B, Shojaie A. "Assumption-Lean Inference for Spectral Differential Network Analysis for High-dimensional Time Series". In preparation. *Draft available on request.*
  * Received a *Best Student Paper Award* from the ASA Statistical Learning and Data Science (SLDS) section. Presented at JSM 2025.

[4] **Hellstern M**, Kim B, Harchaoui Z, Shojaie A. "Spectral Differential Network Analysis for High-dimensional Time Series". *AISTATS (2025)*. DOI: 10.48550/arXiv.2412.07905
  * Received a *Best Student Poster Honorable Mention* from the ASA Statistical Learning and Data Science (SLDS) Section.

[5] **Hellstern M**, Ma J, Yue K, Shojaie A. "netgsa: Fast computation and interactive visualization for topology-based pathway enrichment analysis". *PLOS Computational Biology 17.6 (2021): e1008979*. DOI: 10.1371/journal.pcbi.1008979

[6] Desai U, Kirson NY, Kim J, Khunti KK, King SB, Trieschman E, **Hellstern M**, Hunt PR, Mukherjee J. "Time to Treatment Intensification After Monotherapy Failure and Its Association With Subsequent Glycemic Control Among 93,515 Patients With Type 2 Diabetes". *Diabetes care 41.10 (2018): 2096-2104*. DOI: 10.2337/dc17-0662

Invited Talks

Assumption-Lean Inference for Spectral Differential Network Analysis of High-Dimensional Time Series
- Joint Statistical Meetings (JSM) *2025*
- Western North American Region of the International Biometric Society (WNAR) *2025*

Spectral Differential Network Analysis for High-Dimensional Time Series
- Western North American Region of the International Biometric Society (WNAR) *2024*
- Joint Conference on Computational and Financial Econometrics and Computational and Methodological Statistics (CFE-CMStatistics) *2024*

Honors & Awards

- *Best Student Paper Award* from the ASA Statistical Learning and Data Science (SLDS) *2025*
- *Best Student Poster Honorable Mention* from the ASA SLDS *2024*
- *Donovan J. Thompson Award* for best combined performance on qualifying exams in UW Biostatistics *2021*

Teaching

University of Washington *Seattle, WA*
Teaching Assistant *Fall 2020, 2021*
- Introduction to Biomedical Data Science (BIOST 544)

Service

- Reviewer for Journal of Machine Learning Research, Journal of the Royal Statistical Society: Series B, Journal of the American Statistical Association

Interests

- Mountain biking, whitewater kayaking, trail running, skiing, ski touring