Sara Ichinaga

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Applied Mathematics Ph.D. candidate with extensive experience with data analysis, mathematical modeling, and machine learning. I am interested in applying and improving data-driven methods with applications across various scientific fields.

SUMMARY OF QUALIFICATIONS

- Completing a Ph.D. in Applied Mathematics with a focus on data analysis and machine learning methods.
- Python expert with experience managing software and collaborating on open-source code.
- Experience communicating high-level mathematical and machine learning concepts to diverse audiences.

EDUCATION

Ph.D. in Applied Mathematics, GPA 3.91/4.0, University of Washington, Seattle, WA — **Expected June 2026**
M.S. in Applied Mathematics, GPA 3.87/4.0, University of Washington, Seattle, WA — **Dec 2022**
B.S. in Applied and Computational Mathematical Sciences, — **June 2021**
GPA 3.94/4.0, Magna Cum Laude, University of Washington, Seattle, WA

RELEVANT COURSEWORK

- (CSE 414) Database Systems
- (CSE 546) Machine Learning
- (CSE 547) Machine Learning for Big Data
- (AMATH 515) Optimization: Fundamentals and Applications
- (AMATH 582) Computational Methods for Data Analysis
- (AMATH 584) Numerical Linear Algebra

PROFESSIONAL EXPERIENCE

Graduate Research and Teaching Assistant to Dr. J. Nathan Kutz and Dr. Steven L. Brunton — **Sept 2021-Present**
Department of Applied Mathematics, University of Washington — **Seattle, WA**

- Developing methodological extensions of the dynamic mode decomposition (DMD) algorithm that are capable of decomposing noisy, multi-scale data and generating sparse, stable spatiotemporal modes.
- Combining sparse regression and regularized optimization techniques with the DMD pipeline in order to identify and extract spatially local features and their time dynamics from time-varying snapshot data.
- Developer and maintainer for the open-source Python package PyDMD: https://github.com/PyDMD/PyDMD.
- Teaching assistant for ENGR 510, an introductory machine learning course for engineering professionals.

Undergraduate Research Assistant to Dr. Bingni W. Brunton — **Feb 2019-Sept 2021**
Department of Biology, University of Washington — **Seattle, WA**

- Utilized the Hankel alternative view of Koopman (HAVOK) algorithm and its various parameterizations to model and analyze chaotic dynamical systems using time-delays and partial measurement data.
- Developed and analyzed modifications to HAVOK that improved the stability and accuracy of the algorithm.
- Deployed network inference techniques to compute networks of connectivity from videos of brain activity.

SELECTED PUBLICATIONS AND PREPRINTS

- Sara M. Ichinaga, Francesco Andreuzzi, Nicola Demo, Marco Tezzele, Karl Lapo, Gianluigi Rozza, Steven L. Brunton, and J. Nathan Kutz. "PyDMD: A Python package for robust dynamic mode decomposition." ***JMLR.*** 2024. **25**(417):1-9. Available: http://jmlr.org/papers/v25/24-0739.html.
- Karl Lapo, Sara M. Ichinaga, and J. Nathan Kutz. "A method for unsupervised learning of coherent spatiotemporal patterns in multi-scale data." ***PNAS.*** **In Press.** Preprint: https://arxiv.org/abs/2408.02396.
- Seth M. Hirsh, Sara M. Ichinaga, Steven L. Brunton, J. Nathan Kutz, and Bingni W. Brunton. "Structured time-delay models for dynamical systems with connections to frenet-serret frame." ***Proceedings of the Royal Society A.*** 2021. **477**(2254): 20210097. Available: https://doi.org/10.1098/rspa.2021.0097.

TECHNICAL SKILLS

Coding Languages: Python (expert), MATLAB, Java, Bash, SQL, R
Python Libraries: Numpy, Matplotlib, Scipy, Pytorch, Scikit-learn, Networkx
Technologies: Git/Github, Jupyter, LaTeX, Microsoft Azure