Killian Wood

PhD Candidate · Applied Mathematics

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Summary

Self-motivated PhD candidate in applied mathematics, advised by Prof. Emiliano Dall'Anese. Has published four first-author works in stochastic optimization demonstrating both theoretical and computational results. Research focuses on solving problems in which optimization shifts data distributions, or for which the objective is prohibitively expensive to compute.

Education

University of Colorado, Boulder — *Boulder, CO*

PhD in Applied Mathematics. — *Expected Defense in May. 2024*

University of Colorado, Boulder — *Boulder, CO*

M.S. in Applied Mathematics — *Awarded May 2022*

California State University, Fullerton — *Fullerton, CA*

B.A in Mathematics — *Awarded May 2019*

Research Experience

University of Colorado, Boulder — *Boulder, CO*

Graduate Research Assistant, advised by Emiliano Dall'Anese — *Aug. 2020 - Current*

- Worked on developing online algorithms for time varying stochastic optimization with decision-dependent distributions. Methods used to find an optimal charging policy for a fleet of electrical vehicles subject to a demand-response price model.
- Developed primal-dual algorithms for solving stochastic saddle point problems (minimax) with decision-dependent distributions. Applied to multi-task learning and competitive games.

National Renewable Energy Laboratory — *Golden, CO*

Graduate Intern, NSF Mathematical Sciences Graduate Internship (MSGI) — *June - Aug. 2023*

- Extension of two-stage algorithm for decision-dependent stochastic optimization to monotone games with statistical learning guarantees.
- Application to electric vehicle charging markets with stations powered via renewable power generators.

Lawrence Livermore National Laboratory — *Livermore, CA*

Graduate Intern, Data Science Summer Institute (DSSI) — *May - Aug. 2022*

- Created novel criterion and optimization routines for finding optimal hyper-parameters in scalable Gaussian Processes (MuyGPs). Work featured in the NeurIPS Workshop on Gaussian Processes, Spatiotemporal Modeling, and Decision-making Systems.
- Built a 3D CNN classifier to predict binding capability of Ligands to proteins for Sars-CoV-2 drug discovery.

Publications

- Wood, K. and Dall'Anese, E. Online Saddle Point Tracking with Decision-Dependent Data. *Proceedings of Machine Learning Research, 2023.* Available here.
- Wood, K. and Dall'Anese, E. Stochastic Saddle Point Problems with Decision-Dependent Distributions. *SIAM Journal on Optimization, 2023.* Available here.
- Wood, K., Dunton, A., Priest, B., and Muyskens, A. Bayesian Hyperparameter Optimization in Scalable Gaussian Processes using Statistical Coverage. *NeurIPS Workshop on Gaussian Processes, Spatiotemporal Modeling, and Decision-making Systems.* Available here.
- Wood, K., Bianchin, G. and Dall'Anese, E. Online Projected Gradient Descent for Stochastic Optimization with Decision-Dependent Distributions. *IEEE Control Systems Letters*. 2021. Available here.

Skills

Software Python (NumPy, PyTorch, Pandas), MATLAB, and LaTeX

Mathematical Specialties Stochastic Optimization, Online Optimization, and Randomized Algorithms

Presentations

International Congress for Industrial and Applied Mathematics — *Waseda University, Tokyo, Japan*

Adaptive Stochastic Subspace Descent — *August 22, 2023*

Conference on Information Sciences and Systems (CISS) — *Johns Hopkins University, Baltimore, MD*

Anticipating Decision-Dependent Feedback in Energy Markets — *March 23, 2023*