

Cassidy K. Buhler (she/her)

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in cassie-buhler

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About

I'm a Ph.D. candidate on the job market for a research position (e.g. post-doc, applied scientist, research scientist) and am particularly interested in roles which address environmental challenges using AI and ML.

Education

2024	Ph.D. Operations & Business Analytics Minor: Computational Data Science <i>Thesis: Advances in Optimization with Applications to Nature Conservation</i> <i>Expected Graduation: June 2024</i>	Drexel University Philadelphia, PA
2019	B.S. Mathematics <i>Statistics Emphasis</i>	University of Utah Salt Lake City, UT

Employment

2019 – Present	Doctoral Research Fellow Led research that applied optimization methods and models to machine learning and land conservation. Project Area #1: Mixed-Integer Nonlinear Optimization + Conservation-Decision Making <ul style="list-style-type: none">Developed an open source decision-making tool for spatial conservation planning using an optimization framework that minimizes a species' predicted extinction risk.Framework allows for more complex decision inputs compared to existing spatial planning models, and can be paired with existing ecological software. <p>📌 Software: https://github.com/cassiebuhler/conservation-dfo.</p> <p>📌 Presentations:</p> <ul style="list-style-type: none">AAAI 2024, Rising Scholars Conference 2023 (MIT Sloan), INFORMS 2023, SIAM 2023, & NEDSI 2023. <p>📌 Papers:</p> <ul style="list-style-type: none">Decision-making for land conservation: A derivative-free optimization framework with nonlinear inputs.Optimal land conservation decisions for multiple species. Project Area #2: Nonlinear Optimization + Machine Learning <ul style="list-style-type: none">Advanced unconstrained optimization methods for nonlinear programming by improving the step direction calculation in nonlinear conjugate gradient methods.Algorithm exhibited reduced iteration count when solving large instances of machine learning problems. <p>📌 Software: https://github.com/cassiebuhler/ConminCG.</p> <p>📌 Presentations: SIAM 2021, INFORMS 2021, & INFORMS 2020.</p> <p>📌 Papers:</p> <ul style="list-style-type: none">Regularized step directions in nonlinear conjugate gradient methods. Under review.Nonlinear conjugate gradient methods for machine learning. In progress.	Drexel University
2019 – Present	Instructor & Teaching Assistant Department of Decision Sciences & MIS <ul style="list-style-type: none">Served as an instructor for 4 classes and 2 workshops, and as a TA for 25+ classes.Created and delivered instructional materials for BS, MS, MBA, Executive MBA, and PhD students.Earned two student-nominated awards for teaching performance, along with course evaluation scores above the college and department average. <p>📌 Awards: TA Excellence Award 2022 & TA Excellence Award (Highly Commended) 2021</p> <p>📌 Subjects: Statistics, Operations Research, Supply Chain Management, Operations Management, MIS, Business Analytics, & Data Mining.</p>	Drexel University

Employment (continued)

2018 –	Research Assistant	University of Utah
2021	<i>Department of Mathematics</i> <ul style="list-style-type: none">• Developed mathematical models to understand the response of castration-resistant prostate cancer under various treatment regimens.• Simulated the dynamics of biological systems as differential equations, formulating the models with differing mechanism complexity.• Evaluated modern treatment regimens under this scheme and disseminated findings to academic and medical audiences. 📄 Paper: <i>Do mechanisms matter? Comparing cancer treatment strategies across mathematical models.</i>	
2018	Computer Scientist Intern <i>Hill Air Force Base</i>	United States Air Force
	<ul style="list-style-type: none">• Conducted research related to improving software for USAF aircraft in the Software Engineering Group.• Hired under the Premier College Intern Program and earned a position in the PALACE Acquire program.	

Technical Skills

Coding

Language	Libraries/Packages/Toolboxes
PYTHON	PyTorch, TensorFlow, Pandas, BeautifulSoup, scikit-learn, Keras, Seaborn, rasterio.
R	tidyverse, ggplot, rgdal, raster, rgeos, SDMTTools, deSolve.
MATLAB	Deep Learning, Statistics & Machine Learning, Optimization, Financial, Computer Vision.

Optimization Software

Solver	Applications
GUROBI	Quadratic programming, Linear programming
Pyomo	Mixed-integer nonlinear programming
CVX	Convex programming
CPLEX	Integer programming
AMPL	Unconstrained nonlinear programming

Publications

C. K. Buhler and H. Y. Benson, “Decision-making for land conservation: A derivative-free optimization framework with nonlinear inputs,” in *Proceedings of the AAAI Conference on Artificial Intelligence.*, Acceptance rate 24.2%, 2024. 📄DOI: 10.48550/arXiv.2308.11549, forthcoming.

C. K. Buhler and H. Y. Benson, “Optimal land conservation decisions for multiple species,” in *Proceedings of the 52nd Northeast Decision Science Institute Annual Conference*, vol. 52, Washington, D.C., 2023, pp. 808–816.

C. K. Buhler, R. S. Terry, K. G. Link, and F. R. Adler, “Do mechanisms matter? Comparing cancer treatment strategies across mathematical models and outcome objectives,” *Mathematical Biosciences and Engineering*, vol. 18, no. 5, pp. 6305–6327, 2021, ISSN: 1551-0018. 📄DOI: 10.3934/mbe.2021315.

Under Review

C. K. Buhler, H. Y. Benson, and D. F. Shanno, “Regularized step directions in nonlinear conjugate gradient methods,” *arXiv preprint arXiv:2110.06308*, 2021, Under 2nd round of review at Mathematical Programming Computation. 📄DOI: 10.48550/arXiv.2110.06308.