David Merrell

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My Goals

I seek a **machine learning and computational biology** research position starting Fall 2022.
I want to harness my PhD expertise in **Bayesian ML** to extract useful insights from **-omic data**.
I aim to use my talents in **probability, statistics,** and **algorithms** to solve industry problems.

Education

PhD Computer Sciences (IN PROGRESS)

Sep 2016 - Present

University of Wisconsin – Madison
Research. Probabilistic models for -omic data and biological pathways.
Advised by Anthony Gitter.

MS Computer Sciences

Sep 2016 - Dec 2018

University of Wisconsin – Madison
Research. Exact probabilistic inference. Advised by Aws Albarghouthi and Loris D'Antoni.

BS Mathematics, cum laude

Apr 2014

Brigham Young University. Minor in Physics. 3.90 GPA

Software

PATHWAYMULTIOMICS.JL *(under development)*

A matrix factorization model for multiomic data. Uses molecular pathways to regularize the factorization, yielding a biologically meaningful representation.
github.com/dpmerrell/PathwayMultiomics.jl Julia

MATFAC.JL *(under development)*

A general-purpose, extensible Julia package for GPU-accelerated matrix factorization.
The core algorithm for PATHWAYMULTIOMICS.JL.
github.com/dpmerrell/MatFac.jl Julia

TCGA PIPELINE

A pipeline that downloads multiomic TCGA data and merges them in a unified HDF5 file.
github.com/dpmerrell/tcga-pipeline Python Snakemake

SPARSE SIGNALING PATHWAY SAMPLING (SSPS)
A method that infers signaling pathway structure from time series proteomic data.
github.com/dpmerrell/ssps Julia Snakemake

TRIALMDP
An algorithm that designs clinical trials with optimal response-adaptive randomization.
github.com/dpmerrell/TrialMDP C++ R

For a more complete list of software, see dpmerrell.github.io/publications

Publications

David Merrell, Thevaa Chandereng, Yeonhee Park. *A Markov Decision Process for Response-Adaptive Randomization in Clinical Trials.* Computational Statistics and Data Analysis. 2023 (TO APPEAR).

David Merrell, Anthony Gitter. *Inferring Signaling Pathways with Probabilistic Programming*. European Conference on Computational Biology (ECCB) 2020
(acceptance rate 20%).

David Merrell, Aws Albarghouthi, Loris D'Antoni. *Weighted Model Integration with Orthogonal Transformations*. International Joint Conference on Artificial Intelligence (IJCAI) 2017
(acceptance rate 26%).

Employment

DataChat, Inc. Summer 2019
Internship. Developed auto-ML infrastructure.

RAND Corporation Sep 2014 - Mar 2016
Operations research, simulations, and data analysis for DoD projects.

Sandia National Laboratories Summer 2013; Summer 2014
Internship. ALEGRA shock and multiphysics simulation code.

Pacific Northwest National Laboratory Summer 2012
Internship. Simulations and data analysis for the NIFFTE nuclear fission experiment.

Skills

Technical

- **Programming Languages.** Python, Julia, C++, MATLAB, R, Java

- **Libraries and Packages.** numpy, scipy, pandas, matplotlib, plotly, sklearn, pytorch, pyro, Gen.jl, CUDA.jl, Zygote.jl, BioConductor, Rcpp
- **Miscellaneous.** git, Snakemake, Linux, LaTeX, Singularity, bash, Jupyter, SolidWorks.

Soft

Writing, public speaking, event planning, polite disagreement, teaching.

Awards and Funding

Predoctoral Training Program in Bio-Data Science
Sep 2019 - Sep 2021

Two years of NIH funding and training via the Biostat. & Medical Informatics Department.

Computer Sciences Summer Research Assistantship
Summer 2017

Summer funding from the CS Department after my first year of graduate school.

Service & Leadership

UW-Madison Student ACM chapter (SACM)
Sep 2016 - present

Held various leadership roles within the local student ACM chapter: Activities Committee chair, Treasurer, Food Committee chair, Social chair.

President — SACM
Aug 2018 - Aug 2019

Restructured the organization. Improved the division of labor. Recruited 25 student officers with clearly defined responsibilities. Increased budget by 50% through fundraising. Planned and executed numerous social and professional activities.

Chair — CS Welcome Weekend Committee
Mar 2018

Organized a weekend of activities for prospective CS graduate students. Led a team of 10 volunteers.

Eagle Scout
Aug 2007 - Present

Teaching

CS 240 (Discrete Mathematics)	TA	Fall 2016
CS 540 (Artificial Intelligence)	TA	Spring 2018
CS 300 (Introductory Programming)	TA	Summer 2018
CS 760 (Machine Learning)	TA	Spring 2019

Personal Interests

Backpacking; running; triathlons; bicycle touring; reading books.