

Daniel Packer

Data Scientist, Machine Learning Researcher, Applied Mathematician

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About me

I use my expertise in the rigorous foundations of statistics and machine learning to develop results for technical and non-technical audiences.

Modeling Philosophy

I believe that subtle analyses of use case and consideration to application can remove unnecessary complexity.

Areas of expertise

Data Science • Machine Learning
• Bayesian Statistics • Computational Methods • Risk Analysis

Interests

Politics • Social Justice • AI Ethics
• Chess • Literature

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GitHub Daniel-Packer

RELEVANT EXPERIENCE

01/2023–Present

Data Scientist – Enterprise Model Risk Management

NATIONWIDE INSURANCE • Columbus, OH 📍

Constructed, improved, and tested production and pre-production models for key business applications. Provided best-practices guidance for junior data scientists.

- Developed `pytorch` non-catastrophe capital allocation model implementing expert-informed correlations
 - Automated key pain-point that previously required days of manual analysis to 10 seconds
 - Discovered previously unknown risks on the order of hundreds of millions of dollars
- Programatized loss ratio selection methodology
 - Brought sensitivity analysis in-house
- Established company-wide ML guidelines for data scientists
 - Developed website to navigate complex ideas



05/2022–08/2022

Explainable AI Intern

MINEDXAI • Dayton, OH 📍

Used topological data analysis, signal processing, and interactive data analysis techniques to provide AI-based interpretable predictions of medical conditions from EKG readings.

- Leveraged wavelet analysis, max filtering, and homology structure of tokenized time series data
- Illustrated key predictions using python plotting libraries `plotly` and `matplotlib`, for presentation to entire company



05/2021–10/2021

ML Competition Winner – Algorithms for Threat Detection

PENN STATE APPLIED RESEARCH LABORATORY • Online 📍

Implemented factorization model with spatio-temporal neighborhood information sharing and regularization.

- Came in first place, with best balance of precision and recall (F1 score of 76%)
- Performed 58% better than baseline.



08/2022–Present

Applied Mathematics PhD Candidate

THE OHIO STATE UNIVERSITY • Columbus, OH 📍

Researched computational mathematics, particularly symmetric machine learning and formal languages.

- Applied interpretable ML/AI techniques to gerrymandering, EKG readings and image recognition, outdoing state-of-the-art on small training data
- Contributed five theorems to the `lean` library, `mathlib`
- Led research team of four into applications of symmetric ML to cosmology
- Mentored two undergraduate researchers in data science



RELEVANT PROJECTS

09/2023–Present

Open Source Contributor

OPTIMAL TRANSPORT TOOLS • <https://github.com/ott-jax/ott> 📍

Completed three accepted pull requests in JAX for project supported by Apple's Machine Learning Research Lab.

- Sped up non-convex optimization by 60%
- New method found 50% smaller minima
- Created 50% faster convex optimal transport tool



06/2023–Present

Website Creator

HOW ARE THE ODDS? • <https://howaretheodds.com> 📍

Hosted various machine learning projects and statistical analyses.

- Used `pytorch` factorization model to predict at-bat outcomes for particular pitcher/batter combinations
- Produced interactive map illustrating the power of a single vote using `react`, `d3`, `numpyro` and JAX
- Developed Typescript backpropogation algorithm for educational tool for how neural networks learn



SKILLS



Strategic/Soft	Non-technical communication	Advanced	Python	6 years
	Multiple project management		R	5 years
	Mentorship	Experienced	SQL	1 year
ML Frameworks	Torch	3 years	Typescript	3 years
	TensorFlow	2 years	Lean	2 years
	JAX	1 year	Scala	< 1 year
JS Frameworks	React	1 year	Expo	< 1 year
	Astro	< 1 year		
Data Visualization	Matplotlib/Seaborn	5 years		
	Plotly	2 years		
	d3	1 year		

LANGUAGES

SELECTED PUBLICATIONS

November 2023	Max Filtering with Reflection Groups ADVANCES IN COMPUTATIONAL MATHEMATICS · Published Demonstrated general framework for symmetric machine learning with sparse data points theoretically and practically. <ul style="list-style-type: none">• Proved and implemented stochastic gradient descent method for preserving symmetric metric information• Developed state-of-the-art signal processing tools for EKG classification
May 2023	Gromov Wasserstein Distance between Spheres FOUNDATIONS OF COMPUTATIONAL MATHEMATICS · Under Review Proved benchmark values for non-convex optimization landscape to match practical implementations of the Gromov Wasserstein distance. <ul style="list-style-type: none">• Demonstrated effectiveness of modern computational approaches• Presented and applied computationally feasible lower bounds

EDUCATION

2019–Present	PhD in Applied Mathematics THE OHIO STATE UNIVERSITY · Columbus, Ohio 📍 Studied the mathematics of Data Science under Prof. Dustin Mixon. Produced major contributions to open source projects and three research publications.	
2014–2018	B.A. in Mathematics, Physics Minor BARD COLLEGE AT SIMON'S ROCK · Great Barrington, MA 📍 Graduated Summa Cum Laude with high honors thesis featuring original research. Presented computational complexity research at conference.	

AWARDS

January 2023	Goss Prize THE OHIO STATE UNIVERSITY · Columbus, Ohio 📍 For research in optimal transport and contributions to open source libraries.
January 2022	Rhodus Graduate Fellowship THE OHIO STATE UNIVERSITY · Columbus, Ohio 📍 For work in computational mathematics.
May 2021	First Year Graduate Teaching Award THE OHIO STATE UNIVERSITY · Columbus, Ohio 📍 For excellence in teaching undergraduates.
May 2019	Division of Science, Mathematics, and Computation Award BARD COLLEGE AT SIMON'S ROCK · Great Barrington, MA 📍 For scholarship and research in mathematics.