

JONATHAN PATSENKER

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EDUCATION

Yale University, New Haven, CT

May 2019 – Present

PhD Applied Mathematics

Selected Courses: Sampling Algorithms in Machine Learning, Applied Data Mining & Machine Learning, Theory of Deep Learning, Topics in Numerical Computation, Harmonic Analysis on Graphs, Topics in Sparse Analysis, Numerical Methods for PDEs

Rensselaer Polytechnic Institute, Troy, NY

May 2018

B.S. Computer Science and Mathematics (Concentration in Operations Research)

Selected Courses: Machine Learning from Data, Computational Optimization, Data Mining, Intro to Data Mathematics, Randomized Algorithms, Computer Algorithms, Math in Medicine and Biology, Math Models of Operations Research

PROFESSIONAL EXPERIENCE

Moderna TX., Norwood, MA

June 2023 – August 2023

Technical Development Intern

- Designed a novel technique, leveraging deep transfer learning methods with approaches based in diffusion geometry to automate analysis of CryoEM image data containing lipid nanoparticles
- Implemented a custom pipeline and codebase to run the novel technique on CryoEM data in an industrial research environment to handle high throughput data
- Designed and implemented a novel method to model the kinetics of relevant reactions for high throughput industrial processing

TECHNICAL SKILLS

- Programming languages and libraries: Python, pytorch, tensorflow, numpy, scipy, R, Matlab, C, C++, Julia, Java
- Areas of Expertise: deep learning, machine learning, generative modeling, computer vision, language modeling, large-scale data analysis, optimization, stochastic processes, numerical computing, general statistical methods, inverse problems

RESEARCH EXPERIENCE

PhD Researcher, Kluger Lab, Yale University

May 2019 – Present

Applied Mathematics Program, Advisor: Yuval Kluger, PhD

- Developing theoretical frameworks for distilling and mining features from large generative models
- Developed, tested, and analyzed a novel method for solving inverse problems by leveraging information generative models with strong theoretical guarantees
- Designed novel deep learning based models and manifold learning models for analyzing high resolution multi-channel images
- Developed large language model-based approaches for robust feature embeddings of protein sequence data
- Developed novel framework for modeling AI model training with physical simulation
- Collaborated with pathologists to design data-driven solutions to drug survivability, cancer identification problems
- Developed and implemented novel tensor imputation methods by leveraging higher-order information efficiently
- Contributed to developing a theoretical framework for the analysis of the popular embedding method, word2vec
- Published peer-reviewed publications at top level conferences and journals

Undergraduate Researcher, Computer Science Department, Rensselaer Polytechnic Institute

Sept 2017 – May 2018

Supervisor: Malik Magdon-Ismail, PhD

- Developed, implemented and tested a statistically informed method for network routing on large graphs

LEADERSHIP EXPERIENCE

Teaching Fellow, Yale Department of Mathematics

Jan 2021 – Present

- Collaborated with faculty to design curriculum in the Discrete Mathematics (MATH 244) course.
- Tutoring undergraduate students in both the Discrete Mathematics (MATH 244) and Structure of Networks (AMTH 160) courses
- Designing, building, and maintaining an automated homework server for the Structure of Networks (AMTH 160) course

Mentor, Yale Biotech Club Datathon

Dec 2022

- Assisted undergraduate, graduate, and professional students in datathon in partnership with Boehringer Ingelheim and Code Ocean for tackling problems in healthcare informatics

Project Leader/External Mentor, Rensselaer Center for Open Source

Sept 2014 – May 2018

- Founded and led a student-based research group in computational music generation and analysis
- Collaborated with students and professors to build style-specific rhythm generators, and chord progression generators
- Worked on feature based and deep learning based approaches for music generation

SELECTED PUBLICATIONS

Jonathan Patsenker, Henry Li, Myeongseob Ko, Ruoxi Jia, and Yuval Kluger. "Injecting Measurement Information Yields a Fast and Noise-Robust Diffusion-Based Inverse Problem Solver." *arXiv preprint arXiv:2508.02964* (2025).

Myeongseob Ko, Henry Li, Zhun Wang, Jonathan Patsenker, Jiachen Tianhao Wang, Qinbin Li, Ming Jin, Dawn Song, and Ruoxi Jia. "Boosting alignment for post-unlearning text-to-image generative models." *Advances in Neural Information Processing Systems* 37 (2024): 85131-85154.

Jonathan Patsenker, Henry Li, Yuval Kluger. "Exponential Weight Averaging as Damped Harmonic Motion." *ICML 2023 Frontiers4LCD Workshop*, 25 July 2023.

Wang, Meng, Jonathan Patsenker, Henry Li, Yuval Kluger, and Steven H. Kleinstein. "Supervised fine-tuning of pre-trained antibody language models improves antigen specificity prediction." *PLOS Computational Biology* 21, no. 3 (2025): e1012153.

Wang, Meng, Jonathan Patsenker, Henry Li, Yuval Kluger, and Steven H. Kleinstein. "Language model-based B cell receptor sequence embeddings can effectively encode receptor specificity." *Nucleic acids research* 52, no. 2 (2024): 548-557.

Daniel E. Carvajal-Hausdorf, Jonathan Patsenker, Kelly P. Stanton, Franz Villarroel-Espindola, Amanda Esch, Ruth R. Montgomery, Amanda Psyri et al. "Multiplexed (18-Plex) Measurement of Signaling Targets and Cytotoxic T Cells in Trastuzumab-Treated Patients using Imaging Mass Cytometry." *Clinical Cancer Research* 25, no. 10 (2019): 3054-3062.

Ariel Jaffe, Yuval Kluger, Ofir Lindenbaum, Jonathan Patsenker, Erez Peterfreund, and Stefan Steinerberger. "The spectral underpinning of word2vec." *Frontiers in applied mathematics and statistics* 6 (2020): 593406.

Lina Irshaid, Jonathan Bleiberg, Ethan Weinberger, James Garritano, Rory M. Shallis, Jonathan Patsenker, Ofir Lindenbaum, Yuval Kluger, Samuel G. Katz, and Mina L. Xu. "Histopathologic and machine deep learning criteria to predict lymphoma transformation in bone marrow biopsies." *Archives of Pathology & Laboratory Medicine* 146, no. 2 (2022): 182-193.

Virginia Savova, Jon Patsenker, Sébastien Vigneau, and Alexander A. Gimelbrant. "dbMAE: the database of autosomal monoallelic expression." *Nucleic acids research* 44, no. D1 (2016): D753-D756.