Yilun Kuang

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Research Interests

Self-Supervised Learning, Control and Planning, Efficient Architecture

Education

2023–present **Ph.D. in Data Science, New York University**, USA.
- Research Focus: Self-Supervised Learning, Control and Planning
- Advisor: Yann LeCun
- Affiliation: CDS, CILVR

2020–2023 : **B.A. in Mathematics with High Honors, Courant Institute, New York University**, USA.
- Latin Honors: Magna Cum Laude with Minor in Computer Science

Publications

Conference Papers

2025 **Customizing the Inductive Biases of Softmax Attention using Structured Matrices**.
Yilun Kuang, Noah Amsel, Sanae Lotfi, Shikai Qiu, Andres Potapczynski, Andrew Gordon Wilson.
International Conference on Machine Learning (ICML), 2025

2024 **Bayesian Optimization of Antibodies Informed by a Generative Model of Evolving Sequences**.
Alan Nawzad Amin, Nate Gruver*, **Yilun Kuang*** (equal contribution), Yucen Lily Li*, Hunter Elliott, Aniruddh Raghu, Calvin McCarter, Peyton Greenside, Andrew Gordon Wilson.
International Conference on Learning Representations (ICLR), 2025, **Spotlight**

2024 **Unlocking Tokens as Data Points for Generalization Bounds on Larger Language Models**.
Sanae Lotfi*, **Yilun Kuang*** (equal contribution), Brandon Amos, Micah Goldblum, Marc Finzi, Andrew Gordon Wilson.
Neural Information Processing Systems (NeurIPS), 2024, **Spotlight**

2023 **Non-Vacuous Generalization Bounds for Large Language Models**.
Sanae Lotfi*, Marc Finzi*, **Yilun Kuang*** (equal contribution), Tim G. J. Rudner, Micah Goldblum, Andrew Gordon Wilson.
International Conference on Machine Learning (ICML), 2024

2023 **Learning Efficient Coding of Natural Images with Maximum Manifold Capacity Representations**.
Thomas Yerxa, **Yilun Kuang**, Eero Simoncelli, SueYeon Chung.
Neural Information Processing Systems (NeurIPS), 2023

Workshop Papers

2025 **Radial-VCReg: More Informative Representation Learning through Radial Gaussianization**.
Yilun Kuang, Yash Dagade, Deep Chakraborty, Erik Learned-Miller, Randall Balestriero, Tim G. J. Rudner, Yann LeCun.
NeurIPS 2025 Workshop: Unifying Representations in Neural Models & Symmetry and Geometry in Neural Representations

2024 **Bayesian Optimization of Antibodies Informed by a Generative Model of Evolving Sequences**.
Alan Nawzad Amin, Nate Gruver*, **Yilun Kuang*** (equal contribution), Yucen Lily Li*, Hunter Elliott, Aniruddh Raghu, Calvin McCarter, Peyton Greenside, Andrew Gordon Wilson.
NeurIPS 2024 Workshop: AI for New Drug Modalities, **Spotlight**

2024 **Unlocking Tokens as Data Points for Generalization Bounds on Larger Language Models**.
Sanae Lotfi*, **Yilun Kuang*** (equal contribution), Brandon Amos, Micah Goldblum, Marc Finzi, Andrew Gordon Wilson.
ICML 2024 Workshop: Theoretical Foundations of Foundation Models, **Best Paper Award**

2023 **Unsupervised Learning on Spontaneous Retinal Activity Leads to Efficient Neural Representation Geometry**.
Andrew Ligeralde*, **Yilun Kuang*** (equal contribution), Thomas Edward Yerxa, Miah N Pitcher, Marla Feller, SueYeon Chung.
NeurIPS 2023 Workshop: Unifying Representations in Neural Models (UniReps)

2023 **Non-Vacuous Generalization Bounds for Large Language Models**.
Sanae Lotfi*, Marc Finzi*, **Yilun Kuang*** (equal contribution), Tim G. J. Rudner, Micah Goldblum, Andrew Gordon Wilson.
NeurIPS 2023 Workshop: Self-Supervised Learning & Mathematics of Modern Machine Learning (M3L)

Poster

2023 **Learning a Visual Representation by Maximizing Manifold Capacity**.
Thomas Yerxa, **Yilun Kuang**, Eero Simoncelli, SueYeon Chung.
Computational and Systems Neuroscience (COSYNE), 2023

Work Experience

June – Sep 2022 **Research Intern at Flatiron Institute, Simons Foundation**.
- Mentor: SueYeon Chung
- Develop a state-of-the-art self-supervised learning algorithm for vision.
- 1 publication in NeurIPS and 1 poster presentation in COSYNE.

Jan 2023 **Open Source Contributor at MosaicML**.
- Implement a distributed training pipeline for efficient deep neural network training. Open source contribution available in the Composer Library documentation.

Fellowships & Awards

2023 – 2028 **Center for Data Science Fellowship**.
- Awarded the NYU Center for Data Science Fellowship for five years and the Data Science Supplementary Fellowship Grant

May 2023 **Nicholas and Andrea Ferrara Research Scholar, Dean's List (2020-2022), DURF Grant Recipient, Best Presenter at NYU Undergraduate Research Conference**.

May 2023 **Meritorious Winner in 2021 Mathematical Contest in Modeling (MCM) (Top 7%)**.

Teaching Assistantship

Fall 2025 **Section Leader**, DS-GA 1018: Probabilistic Time Series Analysis, New York University.

Fall 2024 **Grader**, CSCI-GA 2565: Machine Learning, New York University.

Spring 2024 **Grader**, DS-GA 1003: Machine Learning, New York University.

Fall 2023 **Section Leader & Grader**, DS-GA 1011: Natural Language Processing with Representation Learning, New York University.

Spring 2022 **Grader**, DS-GA 1012: Natural Language Understanding and Computational Semantics, New York University.

Summer School

Summer 2020 **Neuromatch Academy in Computational Neuroscience**, Virtual.

Summer 2020 **Summer Session in Mathematics**, Harvey Mudd College, CA.

Project Report

Dec 2022 **A Survey of Double Descent in High-Dimensional Linear Regression**, [Link].

May 2022 **A Survey of Lazy and Feature Learning Regimes**, [Link].

May 2021 **Scale-Invariant Finetuning for Improved Generalization** , [Link].

Position of Responsibility

Conference **Reviewer**, NeurIPS 2024, NeurIPS 2025 Datasets and Benchmarks Track, ICML 2025, ICLR 2025-2026, AISTATS 2026, AAAI 2026.

Workshop **Reviewer**, NeurIPS 2023 Workshop: Self-Supervised Learning - Theory and Practice, ICML 2024 Workshop: Theoretical Foundations of Foundation Models (TF2M), NeurIPS 2024 Workshop: Adaptive Foundation Models: Evolving AI for Personalized and Efficient Learning (AFM), NeurIPS 2025 Workshop: Unifying Representations in Neural Models (UniReps), NeurIPS 2025 Workshop: Symmetry and Geometry in Neural Representations (NeurReps).

Media Coverage

Sep 2025 **How a Little Known Math Paper Inspired New Attention Mechanisms**, NYU Center for Data Science.

June 2024 **Do Large Language Models Really Generalize? This Paper Says Yes** , NYU Center for Data Science.

Computer skills

Programming Languages: Python, C++, C, Java, Matlab, Julia, SQL, Bash, Vim, LaTex

Machine Learning: PyTorch, Jax, Hugging Face, TensorFlow, Scikit-Learn, GPyTorch, NumPy, Pandas

Cloud Services/Other: AWS, GCP, Docker, Kubernetes, Vim, Git, MicroService, CUDA, OpenMP, MPI