

Summary

I primarily study machine learning and theoretical computer science, with a focus on the foundations of machine learning, optimization, and statistics as well as their applications in natural language understanding, neuroscience, robotics, and economics. I am interested in research opportunities involving the application of algorithms and statistics, particularly to scientific inquiry and artificial intelligence.

Currently, I am interested in methods for **resource-efficient** machine learning: especially in terms of space-constrained learning and model compression, and in particular as these can be applied to sequence modeling and reinforcement learning.

I am also very interested in questions at the intersection of multi-agent learning, strategic learning, economics, and algorithmic game theory, especially regarding controlling learning agents via changes to their environment to ensure they have **reliable, aligned, and controllable behavior**.

Education

Columbia University, September 2017 — June 2022

Ph.D. in Computer Science

Advisors: Professor Daniel Hsu, Professor Alex Andoni

Thesis: Resource-Efficient Methods in Machine Learning

Princeton University, September 2012 — June 2017

A.B. Mathematics (cum laude), M.S.E. Computer Science

Advisors: Professor Sanjeev Arora (CS), Professor Ken Norman (Neuroscience)

Research

Note that * indicates equal contribution. In theory publications, the citation order is alphabetical by last name.

Preprints

13. *History-Restricted Online Learning*.
Jon Schneider*, **Kiran Vodrahalli***.
12. *Nonlinear Initialization Methods for Low-Rank Neural Networks*.
Kiran Vodrahalli, Rakesh Shivanna, Maheswaran Sathiamoorthy,
Sagar Jain, Ed H. Chi.

Conference Proceedings

11. *The Platform Design Problem*.
Christos Papadimitriou*, **Kiran Vodrahalli***, Mihalis Yannakakis*.
Oral Presentation. Conference on Web and Internet Economics, Dec. 2021.
Spotlight Oral Presentation (top 10%). StratML Workshop, NeurIPS 2021.
Oral Presentation at NetEcon Workshop, EC 2021. Poster at EC 2021.
10. *The Logical Options Framework*.
Brandon Araki, Xiao Li, **Kiran Vodrahalli**, Jonathan DeCastro, J. Micah Fry,
Daniela Rus.
(Long) Oral Presentation and Poster. ICML, July 2021.

9. *Deep Bayesian Nonparametric Learning of Rules and Plans from Demonstrations with a Learned Automaton Prior.*
 Brandon Araki, **Kiran Vodrahalli**, Thomas Leech, Cristian Ioan Vasile,
 Mark Donahue, Daniela Rus.
Spotlight Presentation. AAAI Conference on Artificial Intelligence, Feb. 2020.
8. *Privacy Accounting and Quality Control in the Sage Differentially Private ML Platform.*
 Mathias Lécuyer, Riley Spahn, **Kiran Vodrahalli**, Roxana Geambasu,
 Daniel Hsu.
Oral Presentation. Symposium on Operation Systems Principles, October 2019.
7. *Learning to Plan with Logical Automata.*
 Brandon Araki*, **Kiran Vodrahalli***, Thomas Leech, Cristian Ioan Vasile,
 Mark Donahue, Daniela Rus.
Spotlight Presentation and Poster. Robotics: Science and Systems, June 2019.
Spotlight Oral Presentation at NeurIPS 2018 Infer2Control Workshop.
6. *Attribute-Efficient Learning of Monomials over Highly-Correlated Variables.*
 Alex Andoni*, Rishabh Dudeja*, Daniel Hsu*, **Kiran Vodrahalli***.
Oral Presentation. Algorithmic Learning Theory, March 2019.
5. *A Large Self-Annotated Corpus for Sarcasm.*
 Mikhail Khodak, Nikunj Saunshi, **Kiran Vodrahalli**.
 Poster. Language Resources and Evaluation, May 2018.
4. *A Compressed Sensing View of Unsupervised Text Embeddings, Bag-of-n-Grams, and LSTMs.*
 Sanjeev Arora*, Mikhail Khodak*, Nikunj Saunshi*, **Kiran Vodrahalli***.
 Poster. International Conference on Learning Representations, April 2018.
Oral Presentation. ICML 2018 Workshop on Theory of Deep Learning.
 Poster at ACL 2018 Workshop on Representation Learning for NLP.
3. *A Temporal Decay Model for Mapping between fMRI and Natural Language Annotations.*
Kiran Vodrahalli, Cathy Chen, Viola Mocz, Christopher Baldassano,
 Uri Hasson, Sanjeev Arora, Kenneth A. Norman.
 Poster. Cognitive Computational Neuroscience, September 2017.

Journal Publications

2. *Learning and Planning with Logical Automata.*
 Brandon Araki, **Kiran Vodrahalli**, Thomas Leech, Cristian-Ioan Vasile,
 Mark Donahue, Daniela Rus.
 Autonomous Robots, August 2021.
1. *Mapping between fMRI responses to movies and their natural language annotations.*
Kiran Vodrahalli, Po-Hsuan Chen, Yingyu Liang, Christopher Baldassano,
 Janice Chen, Christopher Honey, Uri Hasson, Peter Ramadge,
 Kenneth A. Norman, Sanjeev Arora.
 Neuroimage, June 2017.
Oral Presentation at NeurIPS 2016 Workshop on Representation Learning
 in Artificial and Biological Networks.
Oral Presentation at ICML 2016 Workshop on Multi-View Representation
 Learning.

Invited Talks

Meta Research, Virtual, May 2022.

Google Brain AutoML, Virtual, May 2022.

Berkeley Center for Human-Compatible Artificial Intelligence (CHAI) Seminar, Virtual, May 2022.

Google Research NYC, Virtual, April 2022.

Google Brain Neural Modeling Group, Virtual, February 2022.

Simons Flatiron Center for Computational Neuroscience, Virtual, February 2022.

Amazon AWS, Virtual, February 2022.

Simons Theory of Computing, Learning in Games Program, Equilibrium Computation and Machine Learning Reading Group, Virtual, February 2022.

Simons Flatiron Center for Computational Mathematics, Virtual, January 2022.

Google Algorithms Seminar, Virtual, November 2021.

Google Learning Theory Group, Virtual, October 2021.

Google Brain, Virtual, August 2021.

NY Academy of Sciences Machine Learning Symposium, Virtual, March 2020.

Yahoo Research, New York, NY, August 2019.

NY Academy of Sciences Machine Learning Symposium, New York, NY, March 2019.

Princeton Neuroscience Institute, Princeton, NJ, September 2017.

Awards

Spotlight Prize at NYAS Annual ML Symposium (2019, 2020)
Selected as one of ten (\approx **top** 10%) speakers to give a spotlight presentation.

NSF Graduate Research Fellowship Award
Awarded March 2016 for Computer Science in the subfield Machine Learning.

Industry Experience

Google Brain, Student Researcher (Fall 2021-Spring 2022)
Part-time employment at Google Brain as a student researcher.

Google Brain, Research Intern (Summer 2021)
Research internship on training deep neural networks with resource constraints.

Teaching

Columbia University

Courses

Fall 2018: TA for COMS 6998 — Computation and the Brain (graduate)

Princeton University

Courses

Spring 2017: TA for COS 511 — Theoretical Machine Learning (graduate)

Fall 2016: TA for COS 397 — Independent Work Seminar in NLP

Spring 2014: Grader for COS 226 — Intro Algorithms

Fall 2013 — 2014: COS Lab TA for COS 126, 226, 217 — Intro Algorithms and Systems

Mentorship

Summer 2021: Advisor for [Algorithmic Game Theory Undergraduate Theory Seminar](#), and designed the seminar syllabus.

Spring 2017: Advised the junior independent work of Cathy Chen (COS '18) and Viola Mocz (NEU '18) in neuroscience with Professor Ken Norman

Spring 2014 — Fall 2016: Seminar Leader for the NLP-ML Reading Group with Dr. Christiane Fellbaum

Service

Reviewing

Reviewer for Transactions of Machine Learning Research (TMLR), ICLR 2021; NeurIPS 2021, 2020; ICML 2022, 2021, 2020 (Top 33% Reviewer in 2020, Expert Reviewer in 2021, 2022); NeuroImage 2017.

References

Alexandr Andoni, Associate Professor, Columbia University
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Daniel Hsu, Associate Professor, Columbia University
djhsu@cs.columbia.edu

Christos Papadimitriou, Professor, Columbia University
christos@columbia.edu