A. Feder Cooper

Cornell University, Department of Computer Science
Email: afc78@cornell.edu Website: https://CacioEPe.Pe

Research

My research interests encompass topics that align the use of AI/ML with broader public values. I create tools that, in the face of uncertainty, guarantee drawing reliable conclusions from empirical studies of AI/ML. This work serves two ends: 1) improving the quality of AI/ML science, and 2) developing normative precision to describe the broader implications of deployed AI/ML systems. For my CS work, I research empirically motivated, theoretically grounded problems in Bayesian inference, model selection, and deep learning. My tech policy and ethics research aims to characterize the relationship between uncertainty, reliability, and accountability, for which I also engage methods from social sciences and the law.

Education

Cornell University
Ph.D. Candidate, Computer Science 2018 – present
Committee: Christopher De Sa (Chair, Computer Science),
Jon Kleinberg (Computer Science and Information Science),
Adrian Sampson (Computer Science),
James Grimmelmann (Law),
Helen Nissenbaum (Information Science)

M.S., Computer Science 2021

Columbia University
B.A., Computer Science and Archaeology, Phi Beta Kappa, *summa cum laude* 2014

Papers

Preprints

A. Feder Cooper, Solon Barocas, Christopher De Sa, and Siddhartha Sen. "Variance, Self-Consistency, and Arbitrariness in Fair Classification." Under submission, 2023. Preprint. [link]

A. Feder Cooper, Jianan Canal Li, Yimeng Zeng, Ruqi Zhang, and Christopher De Sa. "Bringing the Heat: Scaling Exact SG-MCMC with Higher Temperatures." Forthcoming preprint, 2023.

Archival publications

A. Feder Cooper, Jonathan Frankle, and Christopher De Sa. "Non-Determinism and the Lawlessness of Machine Learning Code." *The 2nd ACM Symposium on Computer Science and Law (CSLAW '22)*, Talk. [link]

A. Feder Cooper and Karen Levy. "Fast or Accurate? Governing Conflicting Goals in Highly Autonomous Vehicles." *Colorado Technology Law Journal*, Vol. 20, 2022. [link]

A. Feder Cooper*, Emanuel Moss*, Benjamin Laufer, and Helen Nissenbaum (*Equal contribution). "Accountability in an Algorithmic Society: Relationality, Responsibility, and Robustness in Machine Learning." *Proceedings of the 5th ACM Conference on Fairness, Accountability, and Transparency (FAccT '22)*, 25% acceptance rate. [link]

A. Feder Cooper and Gili Vidan. "Making the Unaccountable Internet: The Changing Meaning of Accounting in the Early ARPANET." *Proceedings of the 5th ACM Conference on Fairness, Accountability, and Transparency (FAccT '22)*, 25% acceptance rate. [link]

Benjamin Laufer, Sameer Jain*, **A. Feder Cooper***, Jon Kleinberg, and Hoda Heidari (*Equal contribution). "Four Years of FAccT: A Reflexive, Mixed-Methods Analysis of Research Contributions, Shortcomings, and Future Prospects." *Proceedings of the 5th ACM Conference on Fairness, Accountability, and Transparency (FAccT '22)*, 25% acceptance rate. [link]

A. Feder Cooper, Yucheng Lu, Jessica Zosa Forde, and Christopher De Sa. "Hyperparameter Optimization Is Deceiving Us, and How to Stop It." *Conference on Neural Information Processing Systems 35 (NeurIPS '21)*, $< 26\%$ acceptance rate. [link]

Preliminary version: *Workshop on Robust Machine Learning* at *The Ninth International Conference on Learning Representations (ICLR '21)*, Non-archival.

A. Feder Cooper, Karen Levy, and Christopher De Sa. "Accuracy-Efficiency Trade-Offs and Accountability in Distributed ML Systems." *Proceedings of the 2021 ACM Conference on Equity and Access in Algorithms, Mechanisms, and Optimization (EAAMO '21)*, **Contributed Talk**, $< 10\%$ of submitted papers. [link]

Preliminary version: *Workshop on Law and Machine Learning* at *The Thirty-seventh International Conference on Machine Learning (ICML '20)*, **Oral**, Non-archival.

A. Feder Cooper, Maria Antoniak, Christopher De Sa, Marilyn Migiel, and David Mimno. " '*Tecnologica cosa*': Modeling Storyteller Personalities in Boccaccio's *Decameron*." *SIGHUM Workshop on Computational Linguistics for Cultural Heritage, Social Sciences, Humanities and Literature* at *The 2021 Conference on Empirical Methods in Natural Language Processing (EMNLP '21)*, Poster only. [link]

A. Feder Cooper and Ellen Abrams. "Emergent Unfairness in Algorithmic Fairness-Accuracy Trade-Off Research." *Proceedings of the Fourth AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society (AIES '21)*, **Contributed Talk**, $< 10\%$ of submitted papers. [link]

Ruqi Zhang*, **A. Feder Cooper***, and Christopher De Sa (*Equal contribution). "Asymptotically Optimal Exact Minibatch Metropolis-Hastings." *Conference on Neural Information Processing Systems 34 (NeurIPS '20)*, **Spotlight**, $< 3\%$ of submitted papers. [link]

Ruqi Zhang, **A. Feder Cooper**, and Christopher De Sa. "AMAGOLD: Amortized Metropolis Adjustment for Efficient Stochastic Gradient MCMC." *Proceedings of the Twenty-third International Conference on Artificial Intelligence and Statistics (AISTATS '20)*. [link]

Non-archival papers

Listed only if there is no associated archival publication above. Not all papers are publicly available.

A. Feder Cooper, Solon Barocas, Christopher De Sa, James Grimmelmann, and Siddhartha Sen. "On Machine Learning Uncertainty, Arbitrariness, and Due Process." *Data (Re)Makes the World Conference*, Information Society Project at Yale Law School, Forthcoming 2023, $< 17\%$ acceptance rate. (Archival version in progress)

Kweku Kwegyir-Aggrey, Jessica Dai, **A. Feder Cooper**, John Dickerson, and Keegan Hines. "A Tale of Two Measures: Optimal Transport for Fair Classification at Any Decision Threshold." Forthcoming, *2023 Workshop on Artificial Intelligence for Social Good* at *The Thirty-Seventh AAAI Conference on Artificial Intelligence (AAAI '23)*. (Archival version in progress)

A. Feder Cooper, Solon Barocas, Karen Levy, and Gili Vidan. " 'We have met the enemy and it is us': Debating the ethics of computing in the pages of *CACM*." *2022 Workshop of the The Special Interest Group for Computing, Information, and Society (SIGCIS '22)*, Talk. (Archival version in progress)

Jessica Zosa Forde*, **A. Feder Cooper***, Kweku Kwegyir-Aggrey, Christopher De Sa, and Michael Littman (*Equal contribution). "Model Selection's Disparate Impact in Real-World Deep Learning Applications." *Workshop on the Science and Engineering of Deep Learning* at *The Ninth International Conference on Learning Representations (ICLR '21)*, **Oral**. [link]

A. Feder Cooper. "Imperfection is the Norm: A Computer Systems Perspective on IoT and Enforcement." *(Im)Perfect Enforcement Conference*, Information Society Project at Yale Law School, **Plenary session**, 2019. [link]

Graduate Honors and Awards

Meta Ph.D. Fellowship Finalist (2023)

One of a handful of students (out of 3200) named as a finalist for the Meta (previously Facebook) Ph.D. fellowship.

Outstanding *ICML* Reviewer ($\leq$ 10%) (2022)

Recognition for high-quality peer reviews for the *Internal Conference on Machine Learning*, one of the premier machine learning venues; awarded to up to 10% of reviewers

Department of Computer Science Service Award (2022)

Recognition for outstanding service to the Department of Computer Science at Cornell University

Admitted to the *FAccT* Doctoral Consortium (2022)

Selective program for doctoral students studying Fairness, Accountability and Transparency in computing, with a focus on preparation for entering the academic job market; co-located with the *2022 ACM Conference on Fairness, Accountability, and Transparency (FAcct '22)*

Named a Rising Star in EECS, MIT (2021)

Prestigious award recognizing "historically marginalized or underrepresented genders who are interested in pursuing academic careers in electrical engineering, computer science, and artificial intelligence and decision-making" [link]

Digital Life Initiative Doctoral Fellowship (2021 – 2022)

Selective Cornell University Bowers College of Computing and Information Sciences fellowship; administered by Professor Helen Nissenbaum at Cornell Tech

***EAAMO* Conference Oral Presentation ($<$ 10%) (2021)**

Highlighted conference oral presentation at the *2021 ACM Conference on Equity and Access in Algorithms, Mechanisms, and Optimization (EAAMO '21)*; given to Accuracy-Efficiency Trade-Offs and Accountability in Distributed ML Systems; awarded to $<$ 10% of submitted papers

***AIES* Conference Oral Presentation ($<$ 10%) (2021)**

Highlighted conference oral presentation at the *2021 AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society (AIES '21)*, the premier AI ethics venue; given to Emergent Unfairness in Algorithmic Fairness-Accuracy Trade-Off Research; awarded to $<$ 10% of submitted papers

***SEDL Workshop at ICLR* Workshop Oral Presentation (2021)**

Highlighted workshop oral presentation at the *Science of Deep Learning (SEDL)* Workshop at the *International Conference on Learning Representations (ICLR '21)*; given to Model Selection's Disparate Impact in Real-World Deep Learning Applications; awarded to 2/15 accepted papers

3rd Place Fellowship Finalist, Two Sigma Ph.D. Diversity Fellowship (2021)

Fellowship Finalist, OpenPhil AI Ph.D. Fellowship (2021)

***NeurIPS* Conference Spotlight Award ($<$ 3%) (2020)**

Highlighted paper at the *Conference on Neural Information Processing Systems 34 (NeurIPS '20)*, one of the premier machine learning venues; given to Asymptotically Optimal Exact Minibatch Metropolis-Hastings; awarded to $<$ 3% of submitted papers

Cornell University Fellowship (2018 – 2019)

Fellowship awarded to select number of incoming Ph.D. students at the Cornell University Bowers College of Computing and Information Sciences

Internships and Assistantships

Artificial Intelligence Policy and Practice (AIPP), Cornell, Ithaca, NY, Spring 2021 – present

Assist faculty PIs Solon Barocas, Jon Kleinberg, and Karen Levy with convening AIPP, a MacArthur-funded interdisciplinary initiative on AI and society. Organize talk schedule, emcee meetings, plan social events to foster student/faculty and cross-disciplinary community, collate information for year-end grant report, built and maintain website.

Microsoft Research, FATE Group, Remote (New York, NY), Summer 2022

Worked with co-mentors Solon Barocas, Siddhartha Sen on CS and interdisciplinary projects regarding statistical variance in ML (papers in progress).

Additional Talks

Unless explicitly mentioned above, all archival publications and non-archival papers had an associated talk. For brevity, only additional talks are listed here.

2022

"Relating Uncertainty, Reliability, and Accountability in ML." Invited guest talk, Facebook AI Research (Meta), Paris, December 2022 (virtual).

"The Problem of Variance in Governing by Algorithm." Intern talk, FATE Group, Microsoft Research, New York, August 2022 (virtual).

"Toward More Reliable Hyperparameter Optimization." [slides]

- Invited guest talk, Robotics Group, Brown Department of Computer Science, May 2022 (virtual)
- Invited guest talk, Michael Carbin's Lab, MIT EECS, February 2022 (virtual)
- Invited guest talk, UberAI, February 2022 (virtual)

2021

"Safely navigating scalability-reliability trade-offs in ML methods." *ICML 2021, Women in Machine Learning (WiML) Un-Workshop*. Session co-leader (with Ruqi Zhang). July 2021 (virtual).

Invited speaker, Professor Rangita de Silva de Alwis's *Spring Policy Lab: AI and Implicit Bias*, University of Pennsylvania Carey School of Law. April 2021 (virtual).

2020

Featured in Professor Charles Isbell's *NeurIPS 2020* Keynote Address: "You Can't Escape Hyperparameters and Latent Variables: Machine Learning as a Software Engineering Enterprise." December 2020. [link]

Teaching

Guest lecturer, CS4787: Principles of Large-Scale Machine Learning | Fall 2022

- Lecture 26. Machine learning on GPUs. ML Accelerators.
- Lecture 27. Deployment and low-latency inference. Real-time learning. Deep neural network compression and pruning.

Developed course materials for final project for Professor Helen Nissenbaum's half-semester course on Values at Play | Cornell Tech, Fall 2020

TA, CS5150: Software Engineering | Cornell University, Spring 2019 and Spring 2020

TA, CS6787: Advanced Machine Learning Systems | Cornell University, Fall 2018

Working Group and Lab Membership

Relax ML Lab, Cornell University, Fall 2018 – present

Advised by Professor Christopher De Sa (Computer Science), the lab focuses on various techniques for *relaxing* accuracy to increase efficiency in machine learning algorithms and systems.

Artificial Intelligence Policy and Practice (AIPP), Cornell University, Fall 2018 – present

Interdisciplinary, MacArthur Foundation-funded initiative, led by Professors Solon Barocas, Jon Kleinberg, Karen Levy, and Helen Nissenbaum. We engage with technical, sociological, and legal experts to understand and guide the future impact of AI and machine learning research and deployed systems.

Algorithms, Law, and Policy (ALP), MD4SG Working Group, Spring 2022 – present

Interdisciplinary working group within Mechanism Design for Social Good (associated with ACM *EAAMO* Conference).

CTRL-ALT Lab, Cornell Tech, Fall 2022 – present

Led by Professor James Grimmelmann (Law), the **C**ornell **T**ech **R**esearch Lab for **A**pplied **L**aw and **T**echnology is studies how law can apply to technology, and technology can apply to law.

FAKE Lab, Cornell University, Spring 2022

Led by Professor Gili Vidan (Information Science), the lab is an interdisciplinary group that studies **F**idelity, **A**uthenticity, and **K**nowability in **E**lectronic media.

Service

Conference and Workshop Reviewer

- **2023**: *ICLR*, *ICML*
- **2022**: *TMLR*, *JMLR*, *NeurIPS* (technical reviewer and ethics), *ICML*, *FAccT*, *EAAMO*
- **2021**: *AIES*, *FAccT*, *ICLR* (*Robust Machine Learning Workshop*), *ICML*, *NeurIPS* (technical reviewer and ethics)
- **2020**: *FAccT*, *NeurIPS* (*Retrospectives Workshop*)

Cornell University, Department of Computer Science (Ithaca, NY)

- **Mentor**, Under-represented Ph.D. applicants support program (2020 – present)
- **President**, Computer Science Graduate Organization (2021 – 2022)
- **Student representative**, Computer Science faculty hiring student meetings (2019 – 2022)
- **Co-leader**, Computer Science and Information Science Ph.D. LGBT group (2019 – 2022)
- **Member**, Computer Science Ph.D. admissions committee (2019 – 2021)
- **Member**, Computer Science Ph.D. admitted student visit team (2019 – 2021)

Black in AI (BAI) (Remote)

Graduate Student Ally Volunteer; Community for facilitating collaboration and increasing representation of Black people in AI (2018 – present)

Cornell, Maryland, Max Planck Summer School (Saarbrücken, Germany)

Graduate Student Volunteer; CS summer school for college students. (August 2019)

Industry Work Experience

Cogitai, Inc. (Acquired by Sony AI, 2019); Remote (New York, NY), 2017 – 2018

Platform Software Engineer, Early-stage, academic spin-off reinforcement learning startup

Betterment; New York, NY, 2015 – 2017

Senior Software Engineer, Late-stage startup; largest independent automated, investing advisor

Amazon; Seattle, WA, 2014 – 2015

Software Development Engineer, Global Retail Catalog Systems, Item Data Quality Team

Undergraduate Honors and Awards

Highest Honors, (*summa cum laude*), Columbia University (2014)

Awarded to the top 5% of the Class of 2014, Columbia College at Columbia University

Phi Beta Kappa, Columbia University (2014)

Elected by Columbia University Phi Beta Kappa faculty; awarded to 10% of the Class of 2014, Columbia College at Columbia University

Russell C. Mills Award in Computer Science (2014)

Awarded by faculty of the Department Computer Science, Columbia University for outstanding academic achievement

Van Amson Service Fellowship (2012)

Selective fellowship awarded to fund full-time summer community service at The Ali Forney Center, a housing and social services organization for LGBTQ youth in New York City

Joshua A. Feigenbaum Prize in Literature Humanities (2011)

Awarded to 2 of 1,300 students in the Class of 2014, Columbia College at Columbia University for writing excellence in year-long Core Curriculum course

Science Research Fellowship (2010 – 2014)

Awarded to 10 students in the incoming Class of 2014, Columbia College at Columbia University to fund summer science research

References

Christopher De Sa
Assistant Professor of Computer Science
Cornell University
cmd353@cornell.edu

Karen Levy
Associate Professor of Information Science
Affiliated Faculty, Cornell Law School
Cornell University
karen.levy@cornell.edu

Jon Kleinberg
Tisch University Professor
Department of Computer Science
Department of Information Science
Cornell University
kleinberg@cornell.edu

James Grimmelmann
Tessler Family Professor of Digital and Information Law
Cornell Law School
Cornell Tech
james.grimmelmann@cornell.edu

Michael L. Littman
University Professor of Computer Science
Brown University
Division Director for Information and Intelligent Systems
National Science Foundation
mlittman@cs.brown.edu

Solon Barocas
Principal Researcher
Microsoft Research
Adjunct Assistant Professor of Information Science
Cornell University
solon@microsoft.com

Miscellany

Languages: English (native), Italian (conversational; advanced reading and writing; intermediate reading of classical/ late-Medieval Italian), Spanish (conversational; advanced reading and writing), German (conversational; intermediate reading and writing), Yiddish (intermediate reading), French (intermediate reading), Portuguese (intermediate reading), Latin (basic reading)

I make a lot of pasta.