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Colin White

Research Interests

I am interested in automating, explaining, and de-biasing deep learning models, from both a theoretical and empirical lens. Much of my work involves designing innovative methods by drawing insights from large-scale studies and designing tools for better benchmarking of machine learning techniques.

Experience

Abacus.AI, San Francisco, CA

Head of Research and Distinguished Scientist — **2022 – Present**
Head of Research — **2020 – 2022**
Research Scientist — **2019 – 2020**

California Institute of Technology, Pasadena, CA

Postdoctoral Scholar, Computing + Mathematical Sciences — **2023 – 2023**
Postdoctoral advisor: Anima Anandkumar

Education

Carnegie Mellon University, Pittsburgh, PA

Ph.D. in Computer Science — **2014 – 2018**
Advisor: Maria-Florina Balcan

Amherst College, Amherst, MA

B.A. in Computer Science and Mathematics — **2010 – 2014**

Selected Leadership Positions

Senior Area Chair for NeurIPS Track on Datasets and Benchmarks 2023	**2023**
Program Chair for AutoML 2023	**2023**
Local Chair and Area Chair for AutoML 2022	**2022**
Organizer for the AutoML Workshop at ICML 2021	**2021**

Selected Honors and Awards

Top 10% of reviewers at NeurIPS 2020, 2021, 2022	**2020 – 2022**
Top 10% of reviewers at ICML 2021, 2022	**2021 – 2022**
Top 10% of reviewers at ICLR 2022	**2022**
2nd place at the CVPR NAS unseen data competition (77 submissions)	**2021**
National Defense Science & Engineering (NDSEG) Fellowship	**2015 – 2018**
Amherst Memorial Fellowship	**2017**
Heidelberg Laureate Forum, invited as a Young Researcher	**2017**
John Woodruff Simpson Fellowship	**2015 – 2016**
Post-Baccalaureate Summer Research Fellowship, Amherst College	**2014**
Computer Science Prize (best thesis), Amherst College	**2014**
Henry F. Dunbar Award, Amherst College Swimming and Diving Team	**2014**
Summa Cum Laude (highest university honors), Amherst College	**2014**

Journal publications

For all publications, "With X, Y, Z" denotes alphabetically ordered authors, and ∗ denotes equal contribution.

"k-center Clustering under Perturbation Resilience."
With Maria-Florina Balcan and Nika Haghtalab.
Transactions on Algorithms (TALG), 2020.

"Small dynamical heights for quadratic polynomials and rational functions."
With Rob Benedetto, Ruqian Chen, Trevor Hyde, and Yordanka Kovacheva.
Experimental Mathematics, 2014.

Conference publications

"Guaranteed Approximation Bounds for Mixed-Precision Neural Operators."
Renbo Tu*, Colin White*, Jean Kossaifi, Boris Bonev, Gennady Pekhimenko, Kamyar Azizzadenesheli, Anima Anandkumar.
International Conference on Learning Representations (ICLR), 2024.

"To the Cutoff... and Beyond? A Longitudinal Perspective on LLM Data Contamination."
Manley Roberts, Himanshu Thakur, Christine Herlihy, Colin White, Samuel Dooley.
International Conference on Learning Representations (ICLR), 2024.

"When Do Neural Nets Outperform Boosted Trees on Tabular Data?"
Duncan McElfresh, Sujay Khandagale, Jonathan Valverde, Vishak Prasad C, Ganesh Ramakrishnan, Micah Goldblum, Colin White.
Neural Information Processing Systems Datasets Track (NeurIPS Datasets Track), 2023.

"Rethinking Bias Mitigation: Fairer Architectures Make for Fairer Face Recognition."
Samuel Dooley*, Rhea Sukthanker*, John P. Dickerson, Colin White, Frank Hutter, Micah Goldblum.
Selected for oral presentation.
Neural Information Processing Systems (NeurIPS), 2023.

"ForecastPFN: Synthetically-Trained Zero-Shot Forecasting."
Samuel Dooley, Gurnoor Singh Khurana, Chirag Mohapatra, Siddartha Naidu, Colin White.
Neural Information Processing Systems (NeurIPS), 2023.

"NAS-Bench-Suite-Zero: Accelerating Research on Zero Cost Proxies."
Arjun Krishnakumar*, Colin White*, Arber Zela*, Renbo Tu*, Mahmoud Safari, Frank Hutter.
Neural Information Processing Systems Datasets Track (NeurIPS Datasets), 2022.

"On the Generalizability and Predictability of Recommender Systems."
Duncan McElfresh*, Sujay Khandagale*, Jonathan Valverde*, John P. Dickerson, Colin White.
Neural Information Processing Systems (NeurIPS), 2022.

"A Deeper Look at Zero-Cost Proxies for Lightweight NAS."
Colin White, Mikhail Khodak, Renbo Tu, Shital Shah, Sébastien Bubeck, Debadeepta Dey.
International Conference on Learning Representations Blog Post Track (ICLR Blog Post), 2022.

"NAS-Bench-Suite: NAS Evaluation is (Now) Surprisingly Easy."
Yash Mehta*, Colin White*, Arber Zela, Arjun Krishnakumar, Guri Zabergja, Shakiba Moradian, Mahmoud Safari, Kaicheng Yu, Frank Hutter.
International Conference on Learning Representations (ICLR), 2022.

"Synthetic Benchmarks for Scientific Research in Explainable Machine Learning."
Yang Liu*, Sujay Khandagale*, Colin White, Willie Neiswanger.
Neural Information Processing Systems Datasets Track (NeurIPS Datasets), 2021.

"NAS-Bench-x11 and the Power of Learning Curves."
Shen Yan*, Colin White*, Yash Savani, Frank Hutter.
Neural Information Processing Systems (NeurIPS), 2021.

"How Powerful are Performance Predictors in Neural Architecture Search?"
Colin White, Arber Zela, Binxin Ru, Yang Liu, Frank Hutter.
Neural Information Processing Systems (NeurIPS), 2021.

"Exploring the Loss Landscape in Neural Architecture Search."
Colin White, Sam Nolen, Yash Savani.
Conference on Uncertainty in Artificial Intelligence (UAI), 2021.

"BANANAS: Bayesian Optimization with Neural Architectures for Neural Architecture Search."
Colin White, Willie Neiswanger, Yash Savani.
AAAI Conference on Artificial Intelligence (AAAI), 2021.

"A Study on Encodings for Neural Architecture Search."
Colin White, Willie Neiswanger, Sam Nolen, Yash Savani.
Selected for spotlight presentation.
Neural Information Processing Systems (NeurIPS), 2020.

"Intra-Processing Methods for Debiasing Neural Networks."
Yash Savani, Colin White, Naveen Govindarajulu.
Neural Information Processing Systems (NeurIPS), 2020.

"Robust Communication-Optimal Distributed Clustering Algorithms."
With Pranjal Awasthi, Ainesh Bakshi, Maria-Florina Balcan, and David Woodruff.
International Colloquium on Automata, Languages, and Programming (ICALP), 2019.

"Data-Driven Clustering via Parameterized Lloyd's Families."
With Maria-Florina Balcan and Travis Dick.
Selected for spotlight presentation.
Neural Information Processing Systems (NeurIPS), 2018.

"Learning-Theoretic Foundations of Algorithm Configuration for Combinatorial Partitioning Problems."
With Maria-Florina Balcan, Vaishnavh Nagarajan, and Ellen Vitercik.
Conference on Learning Theory (COLT), 2017.

"Data Driven Resource Allocation for Distributed Learning."
With Travis Dick, Mu Li, Krishna Pillutla, Maria-Florina Balcan, and Alex Smola.
International Conference on Artificial Intelligence and Statistics (AISTATS), 2017.

"Learning Combinatorial Functions from Pairwise Comparisons."
With Maria-Florina Balcan and Ellen Vitercik.
Conference on Learning Theory (COLT), 2016.

"k-center Clustering under Perturbation Resilience."
With Maria-Florina Balcan and Nika Haghtalab.
International Colloquium on Automata, Languages, and Programming (ICALP), 2016.

"Lower Bounds in the Preprocessing and Query Phases of Routing Algorithms."
Colin White.
European Symposium on Algorithms (ESA), 2015.

Theses

"New Aspects of Beyond Worst-Case Analysis."
Colin White.
Ph.D. Thesis, Carnegie Mellon University, 2018.

"Lower Bounds in the Preprocessing and Query Phases of Routing Algorithms."
Colin White.
Undergraduate Thesis, Amherst College, 2014.

Workshop publications

"Physics-Informed Neural Operators with Exact Differentiation on Arbitrary Geometries."
Colin White, Julius Berner, Jean Kossaifi, Mogab Elleithy, David Pitt, Daniel Leibovici, Zongyi Li, Kamyar Azizzadenesheli, Anima Anandkumar.
NeurIPS Workshop on the Symbiosis of Deep Learning and Differential Equations, 2023.

"A Natural Experiment on LLM Data Contamination in Code Generation."
Manley Roberts, Himanshu Thakur, Christine Herlihy, Colin White, Samuel Dooley.
Selected as a contributed talk.
NeurIPS Workshop on Failure Modes in the Age of Foundation Models (ICBINB), 2023.

"Speeding up Fourier Neural Operators via Mixed Precision."
Colin White*, Renbo Tu*, Jean Kossaifi, Gennady Pekhimenko, Kamyar Azizzadenesheli, Anima Anandkumar.
ICML Workshop on the Synergy of Science and Machine Learning, 2023.

"ForecastPFN: Synthetically-Trained Zero-Shot Forecasting."
Samuel Dooley, Gurnoor Singh Khurana, Chirag Mohapatra, Siddartha Naidu, Colin White.
ICLR Workshop on ML for Developing Countries: Learning under Low Resource Settings, 2023.

"AutoML for Climate Change: A Call to Action."
Renbo Tu, Nicholas Roberts, Vishak Prasad, Sibasis Nayak, Paarth Jain, Frederic Sala, Ganesh Ramakrishnan, Ameet Talwalkar, Willie Neiswanger, Colin White.
NeurIPS Workshop on Tackling Climate Change with Machine Learning, 2022.

"On the Importance of Architectures and Hyperparameters for Fairness in Face Recognition." Rhea Sukthanker*, Samuel Dooley*, John P. Dickerson, Colin White, Frank Hutter, Micah Goldblum.
NeurIPS Workshop on Meta Learning, 2022, and
NeurIPS Workshop on Trustworthy and Socially Responsible Machine Learning, 2022.

"Speeding up NAS with Adaptive Subset Selection."
Vishak Prasad, Colin White, Paarth Jain, Sibasis Nayak, Rishabh Iyer, Ganesh Ramakrishnan.
Workshop at AutoML, 2022.

"On the Generalizability and Predictability of Recommender Systems."
Duncan McElfresh*, Sujay Khandagale*, Jonathan Valverde*, John P. Dickerson, Colin White.
Workshop at AutoML, 2022.

"Synthetic Benchmarks for Scientific Research in Explainable Machine Learning."
Yang Liu*, Sujay Khandagale*, Colin White, Willie Neiswanger.
ICML Workshop on Explainable AI, 2021.

"NAS-Bench-x11 and the Power of Learning Curves."
Shen Yan*, Colin White*, Yash Savani, Frank Hutter.
CVPR Workshop on Neural Architecture Search, 2021.

"How Powerful are Performance Predictors in Neural Architecture Search?"
Colin White, Arber Zela, Binxin Ru, Yang Liu, Frank Hutter.
Selected as a contributed talk.
ICLR Workshop on Neural Architecture Search, 2021.

"A Study on Encodings for Neural Architecture Search."
Colin White, Willie Neiswanger, Sam Nolen, Yash Savani.
ICML Workshop on AutoML, 2020.

"Local Search is State of the Art for Neural Architecture Search Benchmarks."
Colin White, Sam Nolen, Yash Savani.
ICML Workshop on AutoML, 2020.

"Neural Architecture Search via Bayesian Optimization with a Neural Network Prior."
Colin White, Willie Neiswanger, Yash Savani.
NeurIPS Workshop on Meta Learning, 2019.

"Deep Uncertainty Estimation for Model-based Neural Architecture Search."
Colin White, Willie Neiswanger, Yash Savani.
NeurIPS Workshop on Bayesian Deep Learning, 2019.

"DECO: Debiasing through Compositional Optimization of Machine Learning Models."
Naveen Govindarajulu, Colin White.
NeurIPS Workshop on Robust AI in Financial Services, 2019.

"Differentiable Functions for Combining First-order Constraints with Deep Learning via Weighted Proof Tracing."
Naveen Govindarajulu, Colin White.
NeurIPS Workshop on Knowledge Representation to ML, 2019.

"Data Driven Resource Allocation for Distributed Learning."
With Travis Dick, Mu Li, Krishna Pillutla, Maria-Florina Balcan, and Alex Smola.
AAAI Workshop on Distributed Machine Learning, 2019.

"An Improved Parallel Iterative Algorithm for Stable Matching."
Colin White, Enyue Lu.
SuperComputing Poster, 2013.

Selected Talks

Neural Architecture Search: The Next Frontier.
UC Berkeley. **2023**
California Institute of Technology. **2023**
Tutorial at AutoML Fall School 2022 (virtual). **2022**
Microsoft Research Redmond (virtual). **2022**
Tutorial with Debadeepta Dey at AutoML 2022 in Baltimore, MD. **2022**
AutoML Seminar, ELLIS Berlin (virtual). **2020**

Research Methodology.
Judson University (virtual). **2021**

AutoML: AI that Builds AI.
PhxMobi Emerging Tech Festival (virtual). **2021**

AutoML Panel Discussion.
AutoML'23, Berlin, Germany (panel chair). **2023**
AutoML Seminar, ELLIS Berlin and Freiburg, Germany (virtual). **2021**
NAS Workshop at ICLR 2021 (virtual). **2021**

An Introduction to Neural Architecture Search.
Abacus.AI webinar. **2020**
Abacus.AI workshop. **2019**
AICamp webinar. **2019**

Data-Driven Clustering via Parameterized Lloyd's Families.
Automated Algorithms Seminar at CMU. **2018**

Robust Communication-Optimal Distributed Clustering Algorithms.
Theory Lunch Seminar at CMU. **2017**

k-center Clustering under Perturbation Resilience.
Simons Institute BWCA Workshop. **2016**
Theory Lunch Seminar at CMU. **2016**
Machine Learning Dept. Journal Club Class at CMU. **2016**
Dagstuhl Workshop on Learning Theory. **2015**

Mentoring

Learning Theory Alliance (Let4All) Mentor **2023**

Deep Learning Indaba Mentor for early-career researchers **2022 - Present**

LatinX AI (LXAI) Mentor for early-career researchers **2021 - Present**

Abacus.AI Mentor for early-career researchers **2019 - Present**

Service

Journal reviewer for JMLR, TPAMI, TALG, Algorithmica **2015 – Present**

Conference reviewer for NeurIPS, ICML, ICLR, AISTATS, AAAI, UAI, FOCS, STOC, SODA, ITCS **2015 – Present**

Doctoral Review Committee Member, CMU **2015 – 2018**
A panel of graduate students and faculty who oversee the Ph.D. program

FreeCSD, a social organization for the Ph.D. department at CMU **2015 – 2018**

Theory Lunch Organizer, CMU **2016**

Ph.D. Admitted Students Open House Organizer, CMU **2016**