Colin White

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Research Interests

My work spans machine learning and theoretical computer science. I am particularly interested in automated machine learning (AutoML) and neural architecture search (NAS), both in designing new methods and in steering the field to give reproducible, fair comparisons between methods.

Experience

Abacus.AI, San Francisco, CA
Head of Research — **Oct. 2020 – Present**
Research Scientist — **May 2019 – Oct. 2020**

Education

Carnegie Mellon University, Pittsburgh, PA
Ph.D. in Computer Science — **Sep. 2014 – Dec. 2018**
Advisor: Maria-Florina Balcan
Thesis committee: Avrim Blum, Anupam Gupta, Yury Makarychev, and David Woodruff

Amherst College, Amherst, MA
B.A. in Computer Science and Mathematics — **Sep. 2010 – May 2014**
GPA: 3.76/4.0

Honors and Awards

Top 8% of reviewers at NeurIPS 2021	**Dec. 2021**
Top 10% of reviewers and expert reviewer at ICML 2021	**July 2021**
2nd place at the CVPR NAS unseen data competition (77 submissions)	**June 2021**
Top 10% of reviewers at NeurIPS 2020	**Dec. 2020**
Top 50% of reviewers at NeurIPS 2019	**Dec. 2019**
National Defense Science & Engineering Fellowship	**Sep. 2014 – Dec. 2018**
Amherst Memorial Fellowship	**Sep. 2016 – Aug. 2017**
John Woodruff Simpson Fellowship	**Sep. 2014 – Aug. 2016**
Post-Baccalaureate Summer Research Fellowship, Amherst College	**Sep. 2014**
Computer Science Prize (best thesis), Amherst College	**May 2014**
Summa Cum Laude, Amherst College	**May 2014**
Henry F. Dunbar Award, Amherst College Swimming and Diving Team	**May 2014**

Journal publications

"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

"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

"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 Student Poster Session, 2013.

Talks

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

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

AutoML Panel Discussion.
AutoML Seminar, ELLIS Berlin and Freiburg, Germany (virtual). **Oct. 2021**
NAS Workshop at ICLR 2021 (virtual). **May 2021**

Bananas, Encodings, and Local Search: Insights into Neural Architecture Search.
AutoML Seminar, ELLIS Berlin and Freiburg, Germany (virtual). **Nov. 2020**

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

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

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

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

Service

Organizer for the AutoML Workshop at ICML 2021 **2021**

Journal reviewer for JMLR, TPAMI, Algorithmica, TALG **2015 – 2020**
Conference reviewer for NeurIPS, ICML, ICLR, AISTATS, AAAI, UAI, FOCS, STOC, SODA, ITCS **2015 – 2020**

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**