

NICHOLAS ROBERTS

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EDUCATION

University of Wisconsin - Madison

August 2021 - Present

Ph.D. Computer Science

- Advisor: Frederic Sala

Carnegie Mellon University

August 2019 - May 2021

M.S. Machine Learning

- Advisors: Ameet Talwalkar, Zachary C. Lipton

University of California San Diego

September 2015 - March 2019

B.S. Computer Science, Mathematics minor

- Advisors: Sanjoy Dasgupta, Garrison W. Cottrell

- Magna Cum Laude with CSE department Highest Distinction honors

Fresno City College

August 2013 - May 2015

PUBLICATIONS

*equal contribution, +alphabetical

WORK IN SUBMISSION

Renbo Tu, **Nicholas Roberts**, Vishak Prasad, Sibasis Nayak, Paarth Jain, Frederic Sala, Ganesh Ramakrishnan, Ameet Talwalkar, Willie Neiswanger, Colin White. (2022). *AutoML for Climate Change: A Call to Action*.

Benedikt Boecking, **Nicholas Roberts**, Willie Neiswanger, Stefano Ermon, Frederic Sala, Artur Dubrawski. (2022). *Generative Modeling Helps Weak Supervision (and Vice Versa)*.

CONFERENCE & JOURNAL PUBLICATIONS

Nicholas Roberts*, Xintong Li*, Tzu-Heng Huang, Dyah Adila, Spencer Schoenberg, Cheng-Yu Liu, Lauren Pick, Haotian Ma, Aws Albarghouthi, Frederic Sala. (2022). *AutoWS-Bench-101: Benchmarking Automated Weak Supervision with 100 Labels*. Neural Information Processing Systems (NeurIPS) Datasets and Benchmarks track, 2022.

Renbo Tu*, **Nicholas Roberts***, Mikhail Khodak, Junhong Shen, Frederic Sala, Ameet Talwalkar. (2022). *NAS-Bench-360: Benchmarking Neural Architecture Search on Diverse Tasks*. Neural Information Processing Systems (NeurIPS) Datasets and Benchmarks track, 2022.

Harit Vishwakarma, **Nicholas Roberts**, Frederic Sala. (2022). *Lifting Weak Supervision To Structured Prediction*. Neural Information Processing Systems (NeurIPS), 2022.

Changho Shin, Winfred Li, Harit Vishwakarma, **Nicholas Roberts**, Frederic Sala. (2022). *Universalizing Weak Supervision*. International Conference on Learning Representations (ICLR), 2022.

Nicholas Roberts*, Mikhail Khodak*, Tri Dao, Liam Li, Christopher Ré, Ameet Talwalkar. (2021). *Rethinking Neural Operations for Diverse Tasks*. Neural Information Processing Systems (NeurIPS), 2021.

Sanjoy Dasgupta⁺, Akansha Dey⁺, **Nicholas Roberts**⁺, Sivan Sabato⁺. (2018). *Learning from discriminative feature feedback*. Neural Information Processing Systems (NeurIPS), 2018.

Chen Zhang*, Yerlan Idelbayev*, **Nicholas Roberts**, Yiwen Tao, Yashwanth Nannapaneni, Brendan M. Duggan, Jie Min, Eugene C. Lin, Erik C. Gerwick, Garrison W. Cottrell, William H. Gerwick. (2017). *Small Molecule Accurate Recognition Technology (SMART) to Enhance Natural Products Research*. Scientific Reports.

WORKSHOP PUBLICATIONS & PREPRINTS

Kaustubh D. Dhole, ..., **Nicholas Roberts** (85), ..., (128 authors). (2022). *NL-Augmenter: A Framework for Task-Sensitive Natural Language Augmentation*.

Aarohi Srivastava⁺, ..., **Nicholas Roberts**⁺ (276), ..., (442 authors). (2022). *Beyond the Imitation Game: Quantifying and Extrapolating the Capabilities of Language Models*.

Nicholas Roberts, Davis Liang, Graham Neubig, Zachary C. Lipton. (2020). *Decoding and Diversity in Machine Translation*. NeurIPS 2020 Resistance AI Workshop.

Mikhail Khodak, Liam Li, **Nicholas Roberts**, Maria-Florina Balcan, Ameet Talwalkar. (2020). *A Simple Setting for Understanding Neural Architecture Search with Weight-Sharing*. ICML 2020 AutoML Workshop.

Mikhail Khodak*, Liam Li*, **Nicholas Roberts**, Maria-Florina Balcan, Ameet Talwalkar. (2020). *Weight-Sharing Beyond Neural Architecture Search: Efficient Feature Map Selection and Federated Hyperparameter Tuning*. MLSys 2020 On-Device Intelligence Workshop.

Nicholas Roberts, Dian A. Yap, Vinay U. Prabhu. (2019). *Deep Connectomics Networks: Neural Network Architectures Inspired by Neuronal Networks*. NeurIPS 2019 Real Neurons and Hidden Units Workshop.

Nicholas Roberts, Poornav S. Purushothama, Vishal T. Vasudevan, Siddarth Ravichandran, Chen Zhang, William H. Gerwick, Garrison W. Cottrell. (2019). *Using Deep Siamese Neural Networks to Speed up Natural Products Research*. NeurIPS 2019 workshop on Machine Learning and the Physical Sciences.

Dian A. Yap, **Nicholas Roberts**, Vinay U. Prabhu. (2019). *Grassmannian Packings in Neural Networks: Learning with Maximal Subspace Packings for Diversity and Anti-Sparsity*. NeurIPS 2019 Workshop on Bayesian Deep Learning.

Nicholas Roberts, Vinay U. Prabhu, Matthew McAteer. (2019). *Model Weight Theft With Just Noise Inputs: The Curious Case of the Petulant Attacker*. ICML 2019 Workshop on Security and Privacy of Machine Learning.

PRESENTATIONS

Rethinking AutoML for Diverse Tasks

Invited Talk Physics \cap ML Seminar, University of Wisconsin - Madison.
Madison, WI. March 2022.

Searching for Convolutions and a More Ambitious NAS

Plenary talk AAAI 2021 Workshop on Learning Network Architecture During Training.
Online. February 2021.

Model Weight Theft With Just Noise Inputs: The Curious Case of the Petulant Attacker

Spotlight presentation ICML 2019 Workshop on Security and Privacy of Machine Learning.
Long Beach, CA, USA. June 2019.

Small Molecule Accurate Recognition Technology: A Digital Frontier to Reshape Natural Product Research

Spotlight presentation Applied Machine Learning Days 2018.
Lausanne, Switzerland. January 2018.

AWARDS

Prove AI Fellowship <i>Prove AI Labs</i>	2021
First-Year CS Departmental Scholarship <i>University of Wisconsin - Madison</i>	2021
“Travel” Award <i>Neural Information Processing Systems (NeurIPS)</i>	2020
UnifyID AI Fellowship <i>UnifyID AI Labs</i>	2019

Outstanding Undergraduate Researcher Award (honorable mention) <i>Computing Research Association (CRA)</i>	2019
Travel Award <i>Neural Information Processing Systems (NeurIPS)</i>	2018
Best Spotlight Presentation Award <i>Applied Machine Learning Days (AMLDD)</i>	2018

EXPERIENCE

Sala Group <i>Research Assistant</i>	August 2021 -
· Ph.D. research on Weak Supervision and Automated Machine Learning advised by Fred Sala	
Talwalkar Lab (SAGE Lab) <i>Research Assistant</i>	May 2020 - August 2020, May 2021 - August 2021
· Explored two directions for expanding NAS search spaces: large scale edge learning and operation learning	
· Gave monthly research presentations to J.P. Morgan researchers	
Amazon AWS AI <i>Applied Scientist Intern</i>	June 2019 - August 2019
· Identified areas for improvement in existing ASR systems when recognizing rare or zero shot entities	
· Researched and developed methods for hypothesis rescoring in ASR systems using neural language modeling	
UnifyID <i>AI Fellow + Machine Learner Intern</i>	February 2019 - June 2019
· Developed a novel model extraction attack against deep learning models for computer vision using just noise inputs	
· Researched ways to apply network neuroscience findings to deep learning	
Intuit <i>Software Engineering Intern</i>	June 2018 - September 2018
· Researched and implemented a novel controllable text generation model as a service within Intuit	
· Identified dynamic topic models as a promising direction for analyzing customer support tickets over time	
Altum <i>Applied Scientist Intern</i>	January 2018 - May 2018
· Developed language model to extract NLP features from text data for cryptocurrency trading	
· Implemented SoTA unsupervised sentiment analysis models for classifying streaming online forum data	
UCSD CSE Department <i>Data Science Tutor</i>	September 2017 - March 2018
· Tutored DSC 10 Introduction to Data Science, under Professor Janine Tiefenbruck	
· Tutored DSC 20 Principles of Data Science, under Professor Marina Langlois	
Teradata <i>Software Engineering Intern</i>	June 2017 - September 2017
· Improved training methodology and architecture of deep learning time series model used internally	
· Developed open source Spark-Teradata connector forked from Databricks connector for AWS Redshift	
Skqrl <i>Software Engineering Intern</i>	June 2016 - December 2016
· Developed web scraping tool to compile product data	
· Designed and implemented search pipeline and database using Python, Django, and MySQL	
ModSpot <i>Software Engineering Intern</i>	January 2016 - March 2016

- Implemented new user account, edit profile, and login designs in Objective-C for iOS application
- Refactored analytics code for gathering statistics on app usage

The Comeback Community

June 2015 - September 2015

Volunteer Full Stack Developer

- Developed website for educational nonprofit using Google Cloud Platform

Fresno City College

January 2015 - May 2015

Tutor

- Tutored calculus, linear algebra, data structures, discrete mathematics, and Android app development

Fresno County Sheriff's Office

May 2013 - August 2013

IT Intern

- Replaced malfunctioning hardware in employee PCs

LEADERSHIP, ACTIVITIES, AND EXTRACURRICULAR

Wisconsin:	Lead competition organizer: AutoML Decathlon competition @ NeurIPS 2022 AutoML Decathlon Hackathon @ Wisconsin AutoML Decathlon Hackathon @ AutoML Fall School 2022 Reviewer: NeurIPS 2022 NeurIPS Datasets and Benchmarks track 2021-2022 ICML 2022	
	Wisconsin Hoofer Sailing Club	Member
CMU:	MSML Student Committee 2019-2021	(Virtual) Event Organizer
	MSML Admissions Committee 2020-2021	Committee Member
UCSD:	Tau Beta Pi Engineering Honor Society	House Leader
	Triton Engineering Student Council	Data Analyst
	Data Science Student Society	Workshop Coordinator
FCC:	Google Developer Group Fresno City College	President/Founder
	Science and Engineering Club	Treasurer

TECHNOLOGIES AND SKILLS

Competent:	Python, PyTorch, AWS, TensorFlow, Java, Scala, C/C++, Unix, Docker
Familiar:	SQL, Kaldi ASR, Google Cloud Platform, Matlab/Octave, JavaScript