

# NICHOLAS ROBERTS

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## EDUCATION

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**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

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\*equal contribution, +alphabetical

## WORK IN SUBMISSION

**Nicholas Roberts**, Xintong Li, Dyah Adila, Sonia Crompt, Tzu-Heng Huang, Jitian Zhao, Frederic Sala. (2022). *Escaping Label Subspaces via Label Geometry*.

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

Samuel Guo\*, Cong Xu\*, **Nicholas Roberts\***, Mikhail Khodak, Junhong Shen, Evan Sparks, Yuriy Nevmyvaka, Frederic Sala, Kashif Rasul, Anderson Schneider, Ameet Talwalkar. (2022). *AutoML Decathlon: Diverse Tasks, Modern Methods, and Efficiency at Scale*. Neural Information Processing Systems (NeurIPS) Competition Track, 2022.

**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<sup>+</sup>, Akansha Dey<sup>+</sup>, **Nicholas Roberts**<sup>+</sup>, Sivan Sabato<sup>+</sup>. (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<sup>+</sup>, ..., **Nicholas Roberts**<sup>+</sup> (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

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*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

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<b>NeurIPS Scholar Award</b> <i>Neural Information Processing Systems (NeurIPS)</i>	2022
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<b>Prove AI Fellowship</b> <i>Prove AI Labs</i>	2021
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<b>First-Year CS Departmental Scholarship</b> <i>University of Wisconsin - Madison</i>	2021
<b>NeurIPS “Travel” Award</b> <i>Neural Information Processing Systems (NeurIPS)</i>	2020
<b>UnifyID AI Fellowship</b> <i>UnifyID AI Labs</i>	2019
<b>Outstanding Undergraduate Researcher Award (honorable mention)</b> <i>Computing Research Association (CRA)</i>	2019
<b>NeurIPS Travel Award</b> <i>Neural Information Processing Systems (NeurIPS)</i>	2018
<b>Best Spotlight Presentation Award</b> <i>Applied Machine Learning Days (AMLDD)</i>	2018

## EXPERIENCE

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<b>Sala Group</b> <i>Research Assistant</i>	August 2021 -
· Ph.D. research on Weak Supervision and Automated Machine Learning advised by Fred Sala	
<b>Talwalkar Lab (SAGE Lab)</b> <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	
<b>Amazon AWS AI</b> <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	
<b>UnifyID</b> <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	
<b>Intuit</b> <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	
<b>Altum</b> <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	
<b>UCSD CSE Department</b> <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	
<b>Teradata</b> <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	

<b>Skqrl</b> <i>Software Engineering Intern</i>	June 2016 - December 2016
<ul style="list-style-type: none"> <li>· Developed web scraping tool to compile product data</li> <li>· Designed and implemented search pipeline and database using Python, Django, and MySQL</li> </ul>	
<b>ModSpot</b> <i>Software Engineering Intern</i>	January 2016 - March 2016
<ul style="list-style-type: none"> <li>· Implemented new user account, edit profile, and login designs in Objective-C for iOS application</li> <li>· Refactored analytics code for gathering statistics on app usage</li> </ul>	
<b>The Comeback Community</b> <i>Volunteer Full Stack Developer</i>	June 2015 - September 2015
<ul style="list-style-type: none"> <li>· Developed website for educational nonprofit using Google Cloud Platform</li> </ul>	
<b>Fresno City College</b> <i>Tutor</i>	January 2015 - May 2015
<ul style="list-style-type: none"> <li>· Tutored calculus, linear algebra, data structures, discrete mathematics, and Android app development</li> </ul>	
<b>Fresno County Sheriff's Office</b> <i>IT Intern</i>	May 2013 - August 2013
<ul style="list-style-type: none"> <li>· Replaced malfunctioning hardware in employee PCs</li> </ul>	

## LEADERSHIP, ACTIVITIES, AND EXTRACURRICULAR

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<b>Wisconsin:</b>	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	
<b>CMU:</b>	Wisconsin Hooper Sailing Club MSML Student Committee 2019-2021 MSML Admissions Committee 2020-2021	Member (Virtual) Event Organizer Committee Member
<b>UCSD:</b>	Tau Beta Pi Engineering Honor Society Triton Engineering Student Council Data Science Student Society	House Leader Data Analyst Workshop Coordinator
<b>FCC:</b>	Google Developer Group Fresno City College Science and Engineering Club	President/Founder Treasurer

## TECHNOLOGIES AND SKILLS

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