

Junhong Shen

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Research Interests

Developing data-centric ML and AutoML techniques for long-tailed ML applications, addressing data scarcity & heterogeneity

Education

Carnegie Mellon University

PH.D. IN MACHINE LEARNING, ADVISOR: [AMEET TALWALKAR](#) (GPA: 4.0/4.0)

Pittsburgh, PA

Sep. 2021 - Present

University of California, Los Angeles

B.S. IN MATHEMATICS OF COMPUTATION (GPA: 4.0/4.0)

Los Angeles, CA

Sep. 2017 - June 2021

Publications

Cross-Modal Fine-Tuning: Align then Refine

ICML 2023 (Oral) [\[paper\]](#) [\[code\]](#) [\[talk\]](#)

Junhong Shen, Liam Li, Lucio M. Dery, Corey Staten, Mikhail Khodak, Graham Neubig, Ameet Talwalkar

Efficient Architecture Search for Diverse Tasks

NeurIPS 2022 [\[paper\]](#) [\[code\]](#) [\[blog\]](#)

Junhong Shen*, Mikhail Khodak*, Ameet Talwalkar

NAS-Bench-360: Benchmarking Neural Architecture Search on Diverse Tasks

NeurIPS 2022 Datasets and Benchmarks Track [\[paper\]](#) [\[website\]](#) [\[blog\]](#)

Renbo Tu*, Nicholas Roberts*, Mikhail Khodak, **Junhong Shen**, Frederic Sala, Ameet Talwalkar

AutoML Decathlon: Diverse Tasks, Modern Methods, and Efficiency at Scale

NeurIPS 2022 Competitions Track [\[paper\]](#) [\[website\]](#)

Nicholas Roberts, ... 24 authors ..., **Junhong Shen**, Evan Sparks

Iterative Teacher-Aware Learning

NeurIPS 2021 [\[paper\]](#) [\[code\]](#)

Luyao Yuan, Dongruo Zhou, **Junhong Shen**, Jingdong Gao, Jeffrey Chen, Quanquan Gu, Ying Nian Wu, Song-Chun Zhu

Theoretically Principled Deep RL Acceleration via Nearest Neighbor Function Approximation

AAAI 2021 [\[paper\]](#) [\[code\]](#)

Junhong Shen, Lin F. Yang

Mathematical Reconstruction of Patient-Specific Vascular Networks Based on Clinical Images and Global Optimization

IEEE Access [\[paper\]](#) [\[code\]](#) [\[talk\]](#)

Junhong Shen, Abdul Hannan Faruqi, Yifan Jiang, Nima Maftoon

Emergence of Pragmatics from Referential Game between Theory of Mind Agents

NeurIPS 2019 Emergent Communication Workshop [\[paper\]](#) [\[code\]](#)

Luyao Yuan, Zipeng Fu, Jingyue Shen, Lu Xu, **Junhong Shen**, Song-Chun Zhu

* Equal Contribution

Work Experience

Microsoft Research, New England

RESEARCH INTERN (MENTOR: [DAVID ALVAREZ-MELIS](#), [NICOLÒ FUSI](#))

Cambridge, MA

May 2023 - Aug. 2023

- Worked on adapting LLMs to specialized domains (e.g., low-resource languages, protein sequences, chemical formulas) via prompt tuning.

Determined AI, Hewlett Packard Enterprise

RESEARCH INTERN (MENTOR: [LIAM LI](#))

Pittsburgh, PA

Jun. 2022 - Dec. 2022

- Worked on fine-tuning LLMs and vision transformers for scientific modalities (e.g., PDE, genomics) via distribution alignment.

Face ID Team, SenseTime

PRODUCT MANAGER INTERN

Beijing, China

Jun. 2018 - Sep. 2018

- Worked on 3D-structured-light Face ID; participated in 5 software version releases, bug fixing, and testing.
- Designed the Face ID demo app; performed user requirements analysis and competitive product analysis, delivered to the team.

Research Experience

SAGE Lab

ADVISOR: [AMEET TALWALKAR](#) (CMU)

Pittsburgh, PA

June. 2021 - Present

- Ph.D. research on developing effective and efficient ML/AutoML tools for solving diverse tasks in practice.

Lin Yang's Group

ADVISOR: [LIN F. YANG](#) (UCLA)

Los Angeles, CA

Jan. 2020 - June 2021

- Studied sample-efficient reinforcement learning; proposed an algorithm for estimating the value functions using nearest neighbor function approximator; provided theoretical justification on the sample complexity.

Center for Vision, Cognition, Learning, and Autonomy (VCLA), UCLA

ADVISOR: [SONG-CHUN ZHU](#), [YING NIAN WU](#) (UCLA)

Los Angeles, CA

Jan. 2019 - June 2021

- Studied how theory of mind (ToM) can be integrated into various ML settings to improve algorithm efficiency.
- **Project 1: Multi-Agent Deep Reinforcement Learning with ToM**
 - Proposed an adaptive ToM algorithm in a referential game setting where the teacher and the student model each other's action likelihood while learning their own Q-functions; studied the emergent communication protocol between the agents.
- **Project 2: Efficient Learners in Iterative Machine Teaching**
 - Integrated ToM into machine teaching; improved teaching efficiency by having the learners model the teacher's training sample selection strategy with maximum likelihood estimation.
- **Project 3: Meta Machine Teaching**
 - Studied how meta-learning can be combined with machine teaching: the teacher monitors a group of students' learning processes, deduces their initial beliefs and learning models, and adapts its teaching scheme to each learner.

Computational Metastasis Lab, Fields Institute for Research in Mathematical Sciences

ADVISOR: [NIMA MAFTOON](#) (UNIVERSITY OF WATERLOO)

Toronto, Canada

Jul. 2019 - Sep. 2019

- Developed a vascular network reconstruction framework that uses (i) the main vessel skeletons segmented from clinical images and (ii) global constructive optimization algorithm to generate patient-specific cerebral vascular models; validated the geometric (lengths, radii) and hemodynamic (pressure, shear stress) properties of the models via histogram analysis and blood flow simulation.

MOE Key Laboratory of Protein Sciences, Tsinghua University

ADVISOR: [JIA-WEI WU](#) (TSINGHUA UNIVERSITY)

Beijing, China

Sep. 2015 - June 2017

- Studied the catalytic mechanism of enzyme HPPD and investigated its protein structure via X-ray diffraction.

Professional Service

Co-organizer of [AutoML Decathlon](#), NeurIPS 2022 Competition Track

CMU MSML Admissions Committee Fall 2022

Conference Reviewer NeurIPS (2022/2023), ICLR (2024)

Teaching Assistant Deep Learning System (CMU 10714), Linear Algebra (UCLA Math 115A)

Talks

Mar. 2023 [Cross-Modal Fine-Tuning](#), AI4Science Talks

Dec. 2022 [DASH: How to Search Over Convolutions](#), The AutoML Podcast

Oct. 2022 [Tackling Diverse Tasks with Neural Architecture Search](#), DLML Journal Club, Mayo Clinic

Honors & Awards

2021 **Daus Prize**, UCLA Awarded to the top five undergraduate students in mathematics.

Los Angeles, CA

2017 - 21 **Dean's Honors List**, UCLA

Los Angeles, CA

Professional Skills

Coding Proficient: Python, C, C++, Bash, R Familiar: MATLAB, Java, Arduino

Tools Git, \LaTeX , PyTorch, Tensorflow, Scikit-learn, OpenCV, OpenAI Gym, Google Cloud Platform, Docker, SolidWorks

Related Coursework

CS Machine Learning, Artificial Intelligence, Information Theory, Computer Vision, Algorithms and Complexities, Advanced Programming, Operating Systems Principles, Deep Learning Systems, Computer Network Fundamentals

Math Linear Algebra, Multivariable Calculus, Differential Equations, Discrete Mathematics, Probability Theory, Stochastic Processes, Mathematical Analysis, Complex Analysis, Optimization, Applied Numerical Methods, Game Theory

Stats Statistical Modeling in Vision and Cognition, Computing and Inference in Vision and Cognition, Data Analysis and Regression