Jiashu Han

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EDUCATION

Massachusetts Institute of Technology   **Cambridge, USA**
Visiting Student   *July 2023 - Present*

Columbia University   **New York, USA**
B.S in Computer Science, GPA: 3.7/4.00   *September 2022 - Present*

Tsinghua University   **Beijing, China**
Visiting Student   *May 2021 - August 2022*

Bard College at Simon's Rock   **Massachusetts, USA**
B.A in Maths and Physics, GPA: 3.85/4.00   *September 2018 - May, 2021*

PUBLICATIONS

- **Jiashu Han**, Ligeng Zhu, and Song Han. "ZEST: ZEro-shot Sparse fine-Tuning." (under review in *ICLR 2024*)

- **Jiashu Han**, Kunzan Liu, Sixian You, etc. "OTF: On-the-fly Transfer-learning Framework for Isotropic Resolution in Volumetric Imaging" (aimed at Science Advances)

- Cassandra Ye, **Jiashu Han**, *et al*. "Learned, Uncertainty-driven Adaptive Acquisition for Photon-Efficient Multiphoton Microscopy." arXiv preprint arXiv:2310.16102. (under review in *Optica*)

- **Jiashu Han**, *et al*. "Massively Parallel Market Simulator for Financial Reinforcement Learning." In *AAAI Workshop 2023*.

- Zixuan Zhou, Xuefei Ning, **Jiashu Han**, *et al*. "CLOSE: Curriculum Learning On the Sharing Extent Towards Better One-shot NAS." In *ECCV 2022*.

SELECTED RESEARCH EXPERIENCE

"OTF: On-the-fly Transfer-learning Framework... "   **with Prof. Sixian You**
Massachusetts Institute of Technology   *June 2023 - Present*

- **Motivation:** Volumetric imaging provides the visualization of tissue structures with richer information. However, the axial resolution is intrinsically worse than the lateral resolution. Existing solutions for recovery suffer both in reconstruction fidelity and training time.

- **Methodology:** We propose to leverage ZEST algorithm developed in HAN lab for a physics-informed deep learning framework that learns from the lateral data distribution to restore the axial resolution.

- **Results:** Our reconstruction outperform previous SOTA methods by a large margin in reconstruction **fidelity**, also decreases the total time from ~**20 GPU hours** down to ~**5 GPU minutes**, achieving a **240x** acceleration. This method also enabled nucleolus level cell phenotyping in **human endometrium** samples.

- **Deliverable:** Work in progress, prepare for submission to Science Advances (First Author)

"ZEST: ZEroshot Sparse Fine-tuning"   **with Prof. Song Han**
Massachusetts Institute of Technology   *February 2023 - October 2023*

- **Motivation:** Inspired by LLM's inference on edge device is in a shard-by-shard manner, along with FSDP, we thought about enabling full fine-tune accuracy by only training specific layers in a LLM.
- **Methodology:** We propose to surgically, sparse fine-tune specific salient parameters chosen by ZEST in a LLM to achieve decrease in training time, memory consumption, and increase in accuracy.
- **Results:** Fine-tuning ZEST selected parameters accounting for only **5~10%** of the total model parameters, could not only significantly accelerate training by **2.3x** times and reduce memory consumption by **2.7x** times in training but also improve the model's generalizability, specifically the performance by **~2%** on LLaMA.
- **Deliverable:** Under Review in ICLR 2024 (First Author)

"Curriculum Learning On the Sharing Extent... "   **with Prof. Yu Wang**
Tsinghua University   *October 2021 - June 2022*

- **Motivation:** One-shot performance estimations of Neural Architecture Search are not be well correlated with the performances in stand-alone training because of the excessive sharing of operation parameters.
- **Methodology:** We propose to apply Curriculum Learning On Sharing Extent (CLOSE) to train the supernet both efficiently and effectively.
- **Results:** Extensive experiments demonstrate that CLOSE can obtain a better ranking quality across different computational budget constraints than other one-shot supernets,
- **Deliverable:** Published in ECCV 2022 (Third Author)

SELECTED INTERN EXPERIENCE

Machine Learning Engineer
Alibaba   *May 2022 - August 2022*

- **Motivation:** Expanding the volume of advertisements encounters diminishing returns, as not every advertisement is guaranteed to capture the attention of consumers.
- **Methodology:** I designed a Bayesian-based deep learning algorithm to predict whether consumers would scan, read, and share specific advertisements.
- **Results:** The algorithm employed beat the previous algorithm in use by 50%, and was launched in several cities including Shanghai and Shenzhen.

SELECTED AWARDS AND ACHIEVEMENTS

- Columbia Engineering Dean's List in recognition of outstanding academic performance in the session of 2022-2023.
- Bard College at Simon's Rock Dean's List in recognition of outstanding academic performance in the session of 2018-2021.

SELECTED COURSES

- **Computer Science:** Introduction to Computer Science (A), Algorithms and Data Structures (A), Programming in C++ (A), Computer Vision I (A), Computer Vision II (A), Artificial Intelligence(A), Natural Language Processing(A-), Topics in Machine Learning (A-), Discrete Math for Computer Science (A)
- **Other:** Analysis (A), Ordinary Differential Equations (A), Complex Analysis (A-), Statistics (A), Probability Theory (A), Intro to Quantum Physics (A), Electricity and Magnetism (A-), Classical Mechanics (A-), Physics I (A), Physics II (A),