XIAOLONG LUO (AARON)

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EDUCATION

Harvard University *Cambridge, Massachusetts*
Ph.D. in Engineering Science *2022 – Present*

University of Science and Technology of China *Anhui, China*
Bachelor of Technology in Statistic *2018 – 2022*

RESEARCH INTERESTS

My ultimate research goal is to develop the *foundations* of next-generation artificial intelligence to enhance AI's effectiveness and practical applications in healthcare. My research interests focus on the following key directions:

- **Flexible Diagnostic Models with Multi-task and Multi-modal Learning.** I work on developing advanced AI models that can simultaneously handle multiple diagnostic tasks while effectively integrating various types of medical data (imaging, clinical notes, lab results) to provide more comprehensive and accurate medical assessments.

- **Democratizing Healthcare Access through AI Agents.** I am dedicated to developing intelligent healthcare agents that make medical resources and consultations more accessible and convenient for everyone. This includes creating AI systems that can provide preliminary medical advice, assist in resource allocation, and bridge the gap between patients and healthcare providers.

PUBLICATIONS

[3] **Towards Interpretable, Sequential Multiple Instance Learning: An Application to Clinical Imaging**
Xiaolong Luo, Hsin-Hsiao Scott Wang, Michael Lingzhi Li
Under Review, 2024

[2] **AI Transformers for Radiation Dose Reduction in Serial Whole-Body PET Scans**
YR Wang, L Qu, ND Sheybani, X Luo, J Wang, KE Hawk, AJ Theruvath, ...
Radiology: Artificial Intelligence (IF: 22.5), Apr. 2023

[1] **Learning Pruning-Friendly Networks via Frank-Wolfe: One-Shot, Any-Sparsity, and No Retraining**
Miao Lu*, Xiaolong Luo*, Tianlong Chen, Wuyang Chen, Dong Liu, Zhangyang Wang
ICLR (Spotlight), Virtual. Mar. 2022

RESEARCH EXPERIENCES

Towards Interpretable Sequential MIL in Medical Imaging *Harvard, May 2023 – Present*
Advisors: Prof. Michael Lingzhi Li (HBS, Harvard), Dr. Scott Wang (HMS)
Enriched the MIL paradigm to handle sequential data mirroring physicians' examination patterns in medical diagnosis workflows, while introducing a novel uncertainty metric and two-stream Transformer architecture with attention mechanisms to enhance interpretability and ensure reverse-invariant traits.

Online Spike Sorting *Harvard, Oct. 2022 – Feb. 2023*
Advisor: Prof. Jia Liu (SEAS, Harvard)
Developed a robust self-training algorithm integrating multiple OOD detection criteria (MSP and NuSA) for real-time neural signal processing, and designed a novel UMAP and Convex Hull based algorithm with adaptive density-distance scoring to address feature shifts between training and testing sets.

Learning Pruning-Friendly Networks via Frank-Wolfe *UT Austin, May 2021 – Oct. 2021*
Advisor: Prof. Zhangyang Wang (ECE, UT Austin)
Proposed an SFW-pruning framework enabling one-shot DNN training and pruning without retraining, and introduced a meta-learning-based initialization scheme achieving SOTA performance with superior transferability across architectures and datasets.

PET/MRI Image Super-Resolution Program *Stanford & USTC, Feb. 2021 – Apr. 2022*
Advisor: Dr. Joyce Wang (Stanford AIMI)
Developed a CNN-Transformer architecture capable of generating clinical-standard PET images from ultra-low-dose (1%)
inputs while maintaining diagnostic accuracy, advancing the possibilities for safe longitudinal imaging studies.

Neural Tangent Kernel & Neural Network Compression *UTS & USTC*
Advisors: Prof. Richard Xu (Univ. of Technology Sydney), Prof. Weiping Zhang (USTC)
Investigated Neural Tangent Kernel properties for two-layer ReLU networks and established theoretical guarantees under
compressed initialization conditions, validating the properties in neural network compression scenarios.

TEACHING ASSISTANT

AM101: Statistical Inference for Scientists and Engineers (Head TF) *Spring 2024*
Instructor: Prof. Rob Howe (Harvard SEAS); Class size: 55

CS 182: Artificial Intelligence *Fall 2023*
Instructors: Prof. Stephanie Gil; Prof. Milind Tambe (Harvard SEAS); Class size: 138

Stat 139: Introduction to Linear Models *Fall 2023*
Instructor: Prof. James Xenakis (Harvard GSAS); Class size: 83

Probability Theory and Mathematical Statistics *Fall 2021*
Instructor: Prof. Canwen Hong (Stat, USTC); Class size: 97

Differential Equation I *Fall 2020*
Instructor: Prof. Wuqing Ning (Applied Math, USTC); Class size: 156

EXTRACURRICULAR ACTIVITIES & INTERESTS

Co-director of the Harvard GSAS Entrepreneur Club, AI Community *Sep. 2022 – Present*
Led initiatives to foster entrepreneurship and AI-focused projects within the Harvard GSAS community.

Member of the Student Union of USTC *Sep. 2018 – Mar. 2020*
Participated in organizing student events and representing student interests at USTC.

Volunteer during the High School Recruiting Week *Jan. 2020*
Assisted in facilitating recruitment events and supporting high school students' transition to university.

Founding Member of FutureX *Jul. 2022 – Jan. 2023*
Established a web3 community, winning the second prize in "H-InnoPitch" and securing pre-seed funding.

CYDP Program (Columbia Young Development Program) *Columbia University, Jan. 2019 – Feb. 2019*
Led a team to win a business plan competition after completing courses in business analytics and machine learning.

AWARDS AND HONORS

The 41st Guo Moruo Scholarship (top 1%, highest honor at USTC) *2021*
Outstanding Student Scholarship, Golden award (top 5%) *2020*
National Scholarship (top 1%, from Ministry of Education of China) *2019*
Chinese Mathematics Competitions, Anhui, The Second Prize *2019*

SKILLS

Languages: C, Python, R, HTML, React, Javascript, Typescript, Node.js
Frameworks: PyTorch, TensorFlow, PyG
Tools: Mathematica, LaTeX, Git, Redis