GUANGYAO (THOMAS) ZHENG

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EDUCATION

Johns Hopkins University — Houston, TX
Ph.D. in Computer Science — *January 2025 - expected May 2026*
Advisors: Dr. Vladimir Braverman; Dr. Michael A. Jacobs
Thesis Focus: *Developing a Multi-Modal, Lifelong-Learning, Privacy-Protected Healthcare AI on the Edge for an Enhanced Personalized Healthcare Experience*

Rice University (GPA: 3.79) — Houston, TX
Ph.D. in Computer Science; Master's Degree earned (12/2024) — *August 2022 - December 2024*
Advisors: Dr. Vladimir Braverman; Dr. Michael A. Jacobs
Thesis Focus: *Developing a Multi-Modal, Lifelong-Learning, Privacy-Protected Healthcare AI on the Edge for an Enhanced Personalized Healthcare Experience*

Johns Hopkins University (GPA: 3.57) — Baltimore, MD
B.S. in Applied Mathematics and Statistics; minor in Computer Science — *August 2018 - June 2022*
Dean's List 2019-2022

PUBLICATIONS

Journal/Conference Papers

[1] **Zheng, G.**, Lee, S., Koh, J., Pahwa, K., Li, H., Xu, Z., Sun, H., Su, J., Cho, S. P., Im, S. I., Jeong, I. C., Braverman. V.. "Hierarchical Deep Learning for Autonomous Multi-label Arrhythmia Detection and Classification on Real-world Wearable ECG Data". *Digital Health.* 2024

[2] Soltoggio, A., Ben-Iwhiwhu, E., Braverman, V., Eaton, E., Epstein, B., **Zheng, G.**, Ge, Y., Halperin, L. , et al. "A Collective AI via Lifelong Learning and Sharing at the Edge". *Nature Machine Intelligence.* 2024

[3] **Zheng, G.**, Braverman, V., Leal, J., Rowe, S., Leung, D., Jacobs, M. A., Parekh, V. S.. "Towards a Collective Medical Imaging AI: Enabling Continual Learning from Peers". *Medical Imaging with Deep Learning. PMLR.* 2024

[4] **Zheng, G.**, Zhou, S., Braverman, V., Jacobs, M. A., Parekh, V. S.. " Selective experience replay compression using coresets for lifelong deep reinforcement learning in medical imaging". *Medical Imaging with Deep Learning. PMLR.* 2023

[5] Lee, S., Koh, J., **Zheng, G.**, Braverman, V., Jeong, I. C.. "Exploring the Possibility of Arrhythmia Interpretation of Time Domain ECG Using XAI: A Preliminary Study".*International Conference on Artificial Intelligence in Medicine. Cham: Springer Nature Switzerland.* 2024

Workshops

[1] **Zheng, G.**, Braverman, V., Jacobs, M. A., Parekh, V. S.. "Asynchronous Decentralized Federated Lifelong Learning for Landmark Localization in Medical Imaging". *FL4Data-Mining at SIGKDD 2023.* 2023

EXPERIENCE

Siemens Healthineers Princeton, NJ
Research Intern *May 2024 - August 2024*
Supervisor: Dr. Ali Kamen, Dr. Sureerat Reaungamornrat

- Developed the **first** deformable medical image registration deep learning foundation model for CT and CBCT images with PyTorch (paper in progress).
- Achieved a **42%** reduction in time spent on trial-and-error hyperparameter tuning by developing an experiment-independent pipeline to optimize deep learning architecture, significantly increasing machine learning application development workflow efficiency.
- Conducted extensive ablation study on model implementation details, loss function selection, and weighting, increasing dice score by **0.16**.
- Optimized multi-node multi-gpu large machine learning model training, speeding up training by **273%**.

RESEARCH

Rice University, Computer Science Department Houston, TX
PhD Researcher; *August 2022 - December 2024*
Advisors: Dr. Vladimir Braverman, Dr. Michael A. Jacobs

- Under DARPA ShELL (Shared Experience Lifelong Learning) grant, developed the **first** asynchronous decentralized distributed lifelong learning system, used for anatomical and pathological landmark localization learning across medical institutions.
- Developed novel time-series real-time arrhythmia multi-label classification on noisy wearable ECG data with a **11%** improvement in accuracy, in collaboration with Korea Institute for Advancement of Technology (KIAT), MEZOO, and Hallym University.
- Developed deep learning algorithm for thyroid cancer prediction on mass spectrometry data, increased the accuracy by **13%** compared to traditional methods, in a collaborative initiative with Baylor College of Medicine (Dr. Livia Eberlin).
- Designed few-shot deep learning algorithm for post-LVAD heart transplant stroke risk prediction using biomarkers and blood markers, with a **90%** prediction accuracy before transplant surgery, in collaboration with Baylor College of Medicine (Dr. Nandan Mondal).
- Innovate clinical note summarization with a Small Language Model for fast training inference time without high-end computational resources, tasks Large Language Models cannot do, in collaboration with Dr. Vishwa Parekh.

Johns Hopkins University, Computer Science Department Baltimore, MD
Research Assistant to Dr. Vladimir Braverman, Dr. Yinzhi Cao *August 2020 - July 2022*

- Led pioneering research under the guidance of Dr. Vladimir Braverman on bioinformatics, developed efficient scRNA-seq clustering using Jensen–Shannon divergence and Leiden clustering algorithm, **0.14** increase in ARI (Adjusted Rand Index) score on the PBMC dataset.
- Conducted cutting-edge research under the mentorship of Dr. Yinzhi Cao on exploring the vulnerability caused by Web Cache Poisoning for exploitable websites' security to protect people's information from malicious attackers.
- Conducted comprehensive research under the mentorship of Dr. Yinzhi Cao, investigating the vulnerabilities stemming from Prototype Pollution to bolster the security of exploitable websites. Dedicated efforts towards safeguarding sensitive information from malicious attackers.

TEACHING EXPERIENCE, HONORS & AWARDS

Head TA for COMP 582: Graduate Design and Analysis of Algorithms — Fall 2024
TA for COMP 557: Introduction to Artificial Intelligence — Spring 2024

Google Cloud Academic Research Grant — Fall 2023
UTHealth 4th Annual Diagnostic and Interventional Imaging Retreat Best Presenter — Spring 2023

MENTORSHIP

Undergraduate students
Co-advised with Dr. Vladimir Braverman

- Zicheng Xu (Rice University) — April 2023 - Present
- Haiming Sun (Rice University) — August 2023 - December 2023
- Junda Su (Rice University) — August 2023 - December 2023

SERVICE

Reviewer for:

- *IEEE Journal of Biomedical and Health Informatics*
- *Learning Health Systems*
- *IEEE Sensors Journal*
- *The 11th IEEE International Conference on Healthcare Informatics*
- *5th MICCAI Workshop on "Distributed, Collaborative and Federated Learning"*

SKILLS

Machine learning, artificial intelligence, algorithm development, computer architecture, deep learning, reinforcement learning, continual learning, medical imaging, computer vision, signal processing and analysis, optimization, NLP, LLM, data analytics, data science, explainability, interpretability

Programming Languages
Python, Java, C, C++, MATLAB, R, HTML, Latex, Javascript, bash

Framework
TensorFlow, Pytorch, Git, Linux, Docker, NumPy, scikit-learn, Pandas

Languages
Fluent in English, Chinese, Japanese, and French