Mingxing (Ethan) Rao

Curriculum Vitae

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Education

Jan. 2023 – Present **Ph.D. in Computer Science**, *Vanderbilt University*, Nashville, USA
Advisor: Daniel Moyer; GPA: 3.76/4.0

Sep. 2018 – May 2022 **B.Sc. (Hons.) in Computer Science**, *Hong Kong Baptist University*, Hong Kong, China
Scholastic Award(Top 2% academic performance of graduates); GPA: 3.7/4.0

Research Interests

Generative Models, Model Inversion, Membership Inference, Monocular Depth Estimation, Representation Learning

Selected Publications

M. Rao, D. Moyer. *Generalization and Memorization in Rectified Flow*. Under review at **ECCV 2026**. Preprint: `https://arxiv.org/pdf/2603.13421v1`

M. Rao, B. Qu, D. Moyer. *Latent Diffusion Inversion Requires Understanding the Latent Space*. Published at **CVPR 2026**. Preprint: `https://arxiv.org/pdf/2511.20592`

M. Rao, B. Qu, D. Moyer. Submitted to **Neurocomputing**. *Score-based Membership Inference on Diffusion Models*. Preprint: `https://arxiv.org/pdf/2509.25003`

M. Rao, B. Jiang, D. Moyer. *Training Noise Token Pruning*. Preprint: `https://arxiv.org/pdf/2411.18092`

M. Rao, Y. Qin, S. Kolouri, J.Y. Wu, D. Moyer. *Zero-shot Prompt-based Video Encoder for Surgical Gesture Recognition*. **IJCARS 2024**; presented at **IPCAI 2024**. Paper: `https://link.springer.com/article/10.1007/s11548-024-03257-1`

Z. Zhang†, **M. Rao**†, Y. Huang, L. Zhang. *A graph-based Gaussian Mixture Variational Autoencoder improves metagenome binning for short contigs*. Poster at **RECOMB 2023**. DOI: `https://doi.org/10.21203/rs.3.rs-3308172/v1`

Experience

Jan. 2026 – Present **Research Assistant**, *The Advanced Research Projects Agency for Health (ARPA-H)*, Nashville, US

- Work on the robotic vision development for an automated surgical program, specializing in Monocular Depth Estimation (MDE) for endoscopic imaging.
- Managed the end-to-end data pipeline, from collection to model architecture design, focusing on high-accuracy absolute depth perception during Central Airway Obstruction (CAO) and Benign Prostatic Hyperplasia (BPH) procedures.

Apr. 2022 – Nov. 2022 **Machine Learning Engineer Intern**, *Baidu NLP Group*, Shenzhen, China

- Developed protein-ligand binding simulation pipelines with Gromacs for data augmentation.
- Designed GNN model improving affinity prediction accuracy on PDBBind.

May 2021 – Jul. 2021 **Research Intern**, *National University of Singapore*, Singapore

- Built academic knowledge graph: entity extraction, graph-based fusion, rule-based inference.
- Conducted blockchain data mining: built graphs from chain data, applied topic modeling to forums.

Sep. 2021 – Dec. 2022 **Undergraduate Researcher**, *Hong Kong Baptist University*, Hong Kong, China

- Improved metagenomic contig binning using Gaussian Mixture VAEs with graph embeddings.
- Results published as co-first author in poster to **RECOMB 2023**.

Teaching

2025 Spring **Teaching Assistant**, *CS4262 Foundations of Machine Learning*, Vanderbilt University
2024 Fall **Teaching Assistant**, *CS4260 Artificial Intelligence*, Vanderbilt University
2024 Spring **Teaching Assistant**, *CS8395 Representation Learning*, Vanderbilt University
2023 Fall **Teaching Assistant**, *DS5460 Big Data Scaling*, Vanderbilt University

Awards

2022 Scholastic Award (Top 2% academic performance of graduates)
2021 C.V. Starr Scholarship Fund (~35,000 HKD)
2021 Faculty of Science Overseas Research Scholarship for Outstanding Students in 2020-2021 (~30,000 HKD)
2019 Mr. & Mrs. Lau Chor Tak Scholarship Scheme for Outstanding Students (~75,000 HKD)

Skills

Programming: Python, PyTorch, TensorFlow, JAX, Java, C/C++, CUDA, Git, Linux, Docker
Languages: English, Chinese