Siyi Chen Ph.D.

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Research Interest

My research interests encompass *generative models*, *representation learning*, and *their connections*. I am keen on understanding the learning mechanisms and the acquired information structure of generative and perceptual models. I aim to utilize the theoretical understandings for unified and interpretable applications while combining inspirations from optimization techniques, principles of physics, and human cognition. Specifically, I am exploring these questions in diffusion models, multimodal learning, self-supervised learning, and dynamics modeling.

Education

College of Engineering, University of Michigan Michigan, US
Ph.D. in Electronic and Computer Engineering 2022 - 2027 *(expected)*

- Advisor: Prof. Qing Qu
- Areas of Study: Generative Models, Representation Learning
- GPA: 4.00/4.00.
- Course Highlights: Optimization (A+), Nonlinear Programming (A+), Matrix Methods (A+), Large Language Models (A), Medical Imaging (A), Medical AI (A).

College of Engineering, University of Michigan Michigan, US
B.S. in Computer Science Engineering 2020 - 2022

- GPA: 3.98/4.00.
- Course Highlights: Algorithms (A+), Linear Algebra (A+), Combinatorics (A+), Advanced Computer Vision (A), Computer Vision (A), Machine Learning (A), Database (A), Data Structures & Algorithms (A).

UM-JI, Shanghai Jiao Tong University Shanghai, China
B.S. in Electronic and Computer Engineering 2018 - 2022

- Course Highlights: Probabilistic Methods (A), Honorable Mathematics (A).

Publications

1. ***Siyi Chen****, Huijie Zhang*, Minzhe Guo, Yifu Lu, Peng Wang, Qing Qu. Exploring Low-Dimensional Subspaces in Diffusion Models for Controllable Image Editing. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2024.
2. ***Siyi Chen***, Minkyu Choi, Kuan Han, Qing Qu, Zhongming Liu. Unfolding Videos Dynamics via Taylor Expansion. In *NeurIPS 2024 Workshop on Self-Supervised Learning*, 2024.
3. Peng Wang, Huijie Zhang, Zekai Zhang, ***Siyi Chen***, Yi Ma, Qing Qu. Diffusion Model Learns Low-Dimensional Distributions via Subspace Clustering. In *NeurIPS 2024 Workshop on Mathematics of Modern Machine Learning*, 2024.
4. Xiao Li, Zekai Zhang, Xiang Li, ***Siyi Chen***, Zhihui Zhu, Peng Wang, Qing Qu. Understanding Diffusion-based Representation Learning via Low-Dimensional Modeling. In *NeurIPS 2024 Workshop on Mathematics of Modern Machine Learning*, 2024.
5. Shengyi Qian, Linyi Jin, Chris Rockwell, ***Siyi Chen***, David F.Fouhey. Understanding 3D Object Articulation in Internet videos. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2022.

Teaching

- Teaching Assistant for **Optimization**, University of Michigan 2024
- Teaching Assistant for **Computer Vision** , University of Michigan 2022
- Teaching Assistant for **Probabilistic Methods**, SJTU 2020
- Teaching Assistant for **Honorable Mathematics**, SJTU 2020

Honors and Awards

- **James B. Angell Scholar** , University of Michigan 2022 - 2023
- **Dean's List**, University of Michigan 2021 - 2022
- **University Honors**, University of Michigan 2021 - 2022
- **The Roger King Scholarship**, University of Michigan 2021
- **Honorable Mention**, The Mathematical Contest in Modeling (MCM) 2020
- **Gold Medal Winner (Top 2%)**, The University Physics Competition (UPC) 2019
- **Excellent Manager**, SJTU Student Union 2019

Skills

Programming: `Python`, `C++/C/C#`, `MATLAB`, `Julia`, `SQL`, `Java`, `HTML`, `Sage`, `Rust`, `Verilog`.

Languages: English, Chinese, Japanese, Spanish.

Tools: `PyTorch`, `TensorFlow`, `CUDA`, `Conda`, `GitHub`, `docker`, `Unity`.

Academic Services

Reviewers for: *Neural Information Processing Systems (NeurIPS)*, *International Conference on Learning Representations (ICLR)*, *Conference on Computer Vision and Pattern Recognition (CVPR)*, *International Conference on Artificial Intelligence and Statistics (AISTATS)*.

Mentorship

- Zesen Zhao, Undergraduate, CSE, University of Michigan 2023 - present

  I worked with Zesen on a project exploring jailbreaking unlearned diffusion models using contrastive representation learning.
- Yeheng Zong, Master, ECE, University of Michigan 2023 - 2024

  I worked with Yeheng on a project designing multi-stream video representation models and algorithms inspired by human cognition.

Leadership

SJTU Student Union. | Shanghai, China. *Manager*. 2019 - 2021

- Organized SJTU Student Debate Competitions.
- Organized Shanghai College Student Debate Competition.

SJTU Student Club Community. | Shanghai, China. *Director.* 2019 - 2021

- Organized Campus Events such as Annual Club Festivals.
- Lectured at SJTU Student Club General Meetings.