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 video 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, Zesen Zhao, 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
	• **Honored Graduate**, Shanghai Jiao Tong University	2022
	• **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

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).

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.`

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.