Last updated: 30 November 2025

Xinxi Zhang

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RESEARCH INTEREST

My research focuses on generative modeling in computer vision, with a current emphasis on advancing efficient and robust one-step diffusion/flow-based modeling. More recently, I have been exploring representation alignment between models in two directions: using aligned representations to enhance generative modeling, and designing generative frameworks that operate across representation spaces to bridge modalities, such as vision and language.

EDUCATION

Rutgers University — New Jersey, USA
Ph.D of Science in Computer Science (Advisor: Prof. Vladimir Pavlovic) — Sept 2024 – Expected May 2029

Rutgers University — New Jersey, USA
Master of Science in Computer Science — Sept 2022 – May 2024

Northeastern University — Liaoning, China
Bachelor of Engineering in Software Engineering — Sept 2018 – June 2022

PUBLICATIONS

[1] **X Zhang**, S Wen, L Han, F Xu, A Srivastava, J Hunag, H Wang, M Tao, V Pavlovic, D Metaxas. "SODA: Spectral Orthogonal Decomposition Adaptation for Diffusion Models" *IEEE Winter Conference on Applications of Computer Vision (WACV), 2025* [pdf]

[2] **X Zhang**, S Wen, L Han, F Xu, A Srivastava, J Hunag, H Wang, M Tao, V Pavlovic, D Metaxas. "SODA: Spectral Orthogonal Decomposition Adaptation for Diffusion Models" *IEEE Winter Conference on Applications of Computer Vision (WACV), 2025* [pdf]

[3] Q Xu, Y Ding, **X Zhang**, J Gao, H Wang. "PAC Privacy Preserving Diffusion Models" *ICLR 2025 Workshop on Deep Generative Model in Machine Learning: Theory, Principle and Efficacy.* [pdf]

[4] F Ye, **X Zhang**, M Stein, AA Ezzat. "DeepMIDE: A Multivariate Spatio-Temporal Method for Ultra-Scale Offshore Wind Energy Forecasting" *arXiv preprint arXiv:2410.20166* [pdf]

RESEARCH EXPERIENCE

Flow Straighter and Faster: Efficient One-Step Generative Modeling via MeanFlow on Rectified Trajectories

PhD Student, Rutgers University

- Introduced **Re-Meanflow**, a simple yet efficient one-step generative modeling framework that leverages the synergy between MeanFlow and Rectified Flow, substantially improving both performance and efficiency over either method alone.
- Demonstrated consistent state-of-the-art one-step FID on class-conditional ImageNet across resolutions and model architectures, surpassing leading rectified-flow, consistency, and flow-map distillation baselines under comparable settings.
- Achieved a **33.4%** FID reduction over 2-Rectified Flow++ on ImageNet 64x64 with a **26.6x** training-efficiency gain, and a **9%** FID reduction over AYF on ImageNet 512x512 with a **2.9x** training-efficiency gain.

SODA: Spectral Orthogonal Decomposition Adaptation for Diffusion Models

PhD Student, Rutgers University

- Proposed **SODA**, a novel spectrum-aware parameter-efficient fine-tuning (PEFT) framework that jointly tunes singular values and orthogonal bases of pretrained weights using Kronecker-structured Stiefel optimization, boosting fine-tuning performance under low parameter budgets.
- Established a superior Pareto frontier between subject fidelity and prompt alignment on Dreambooth-style personalization tasks, outperforming previous PEFT benchmarks like LoRA, OFT, and SVDiff on Stable Diffusion XL.

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WORK EXPERIENCE

Computer Vision Engineer (Intern)

Vipshop May 2021 – Sept 2021

- Developed and deployed an EfficientNet/YOLO-based pipeline for automated apparel image tagging, identifying over 2,000 new commodities per query, resulting in a daily revenue increase of ~$400K.
- Contributed to two machine learning-related patents.

RESEARCH PROJECTS

Domain Adversarial Adaptation with Diffusion Models

Hao Wang's Machine Learning Group, Rutgers University Apr 2023 – Jul 2023

- Developed a novel classification-based domain adaptation method using the Latent Diffusion Models for feature extraction within Domain-Adversarial Neural Networks (DANN).
- Investigated style transfer from a discriminative perspective, steering domain shifts via domain-specific signals learned by DANN.
- Enhanced DANN adversarial training by sampling multiple timesteps along diffusion trajectories and employing a transformer-based feature extractor to balance the discriminator and classifier.

DeepMIDE: A Multivariate Spatio-Temporal Method for Ultra-Scale Offshore Wind Energy Forecasting

The Renewables & Industrial Analytics (RIA) Research Lab, Rutgers University Sept 2023 – Jan 2024

- Architected a Transformer-based framework for parameterizing a statistical model to forecast offshore wind energy. Tackled the absence of a closed-form solution and enabled efficient forecasting by circumventing the time-consuming traditional statistical optimization.
- Designed a CNN and attention-based deep learning model to identify the underlying spatio-temporal physics of local wind fields.
- Reduced forecast time from 5 minutes to seconds and improved online forecast MAE by 10% compared to pure statistical approaches.

Image Editing with Diffusion Models

The Art and Artificial Intelligence Laboratory, Rutgers University Jan 2023 – Apr 2023

- Identified a dichotomy of current methods: inversion techniques are efficient but limited in complex editing, while fine-tuning methods enable complex edits but demand computationally intensive fine-tuning.
- Reimplemented and evaluated these state-of-the-art methods. Open-sourced an implementation of "DreamBooth" without official code, enhancing its functionality in a compositional setting. (GitHub)
- Fine-tuning Stable Diffusion using Vivian Maier's photography to explore the generation of images in her distinctive style. (Hugging Face)

AWARDS

- First Place, 2024 IISE Annual Meeting QCRE Track Best Student Poster Award (*Paper: "DeepMIDE: A Multivariate Spatio-Temporal Method for Ultra-Scale Offshore Wind Energy Forecasting"*)
- Third-class Scholarship (*Northeastern University*)

TEACHING & ACADEMIC SERVICES

- **Teaching Assistant:** CS 210: Data Management for Data Science (2023 Fall, 2024 Spring), CS 535: Machine Learning (2023 Fall, 2024 Spring), CS 462: Deep Learning (2024 Fall), CS 205: Introduction to Discrete Structures I (2025 Spring), CS 336: Principles of Information and Data Management (2025 Fall)
- **Reviewer:** ICLR 2026, CVPR 2026

SKILLS

- **Language:** English, Cantonese, Mandarin
- **Coding:** Python, Pytorch, LATEX