

Shangjie Du

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EDUCATION

University of California Merced | *Merced, CA* 08/2023 - Present

M.S., Electrical Engineering and Computer Science (GPA: 4/4, top 1%)

Area of Study: Computer Vision, Vision Language Model, Text-to-Image Generation

Advisor: Meng Tang

Courses of Study: Large Language Model, Deep Learning, Digital Image Processing

Columbia University | *New York, NY* 09/2021 - 12/2022

M.A., Statistics (GPA: 4.14/4.33, top 5%)

Area of Study: Statistical Machine Learning, Human Activity Classification

Courses of Study: Probability and Statistical Inference, Stochastic Process, Bayesian Statistics, Nonparametric Statistics, Advanced Machine Learning, Machine Learning Image Analysis, Database System

Nanjing University | *Nanjing, China* 09/2017 - 06/2021

B.S., Mathematics (GPA: 4.27 / 5, top 20%)

Courses of Study: Probability, Numerical Analysis, Stochastic Process, Convex Optimization, Real and Functional Analysis, Information Theory, Statistical Machine Learning, Artificial Intelligence, Data Mining

SELECTED PROJECTS

VisLoc-VLM: Semantic Reasoning in Vision Language Model for Relative Camera Pose Estimation | *UC Merced* 01/2025

- Present

- Design and customize Qwen2/LLaVA-OneVision for camera pose estimation based on the LLaVA codebase. Prepare multiple vision datasets (ArkitScene, MegaDepth, ScanNet) for vision-language fine-tuning.
- Build VLM training and evaluation pipeline with PyTorch and DeepSpeed.
- Fine-tune VLM on 8xH100 GPUs with QLoRA and monitor training with wandb. The model achieves comparable performance to SOTA method on relative camera pose estimation, and enables a VLM to perform relative camera pose estimation for the first time.
- (Ongoing) Deploy Qwen2.5-VL-72B locally and annotate semantic camera pose description on multiple vision datasets. Train VLM for reasoning capability on vision tasks.
- (Ongoing) Explore a variant of the task: instructive camera trajectory generation. Validate concept by training a trajectory diffusion model on a subset of the SpatialVID-HQ dataset.

SafeGRPO: Safety Alignment for Text-to-Image Generation with GRPO | *UC Merced* 08/2025 - Present

- Explore safety reward models (ShieldGemma, NudeNet, Q16, etc) for Reinforcement Learning. Conduct statistical analysis of models' evaluation results on multiple T2I safety datasets.
- Build reward modeling and training pipeline based on DanceGRPO codebase, and fine-tune Stable Diffusion 1.5 on Co-Prov2 dataset using GRPO.
- Build evaluation pipeline for Inappropriate Score, FID, and CLIP Score evaluation. The model achieves slightly better results than the SOTA method.
- (Ongoing) Add clip score into the safety reward modeling process to mitigate reward hacking and generation quality degradation.
- (Ongoing) Hyperparameter tuning to achieve better FID and CLIP Score, while balancing the safety and generation.

GraPhy: Graph-Based Physics-Guided Urban Air Quality Modeling for Monitoring-Constrained Regions | *UC Merced*

08/2023 - 07/2024

- Design graph neural networks that mimic the diffusion and convection processes of air pollutants' physical fluid dynamics to compensate for data spatial sparsity.

- Relax the requirement for fine-grained meteorology data in most related works and design specialized message-passing mechanisms to accommodate extremely sparse meteorology data.
- Leveraging the flexibility of graph neural networks, we combine the temporal learning on nodes with the spatial learning from the message-passing mechanism and achieve the spatial-temporal modeling of air pollution. Reduce 15.1%-33.6% absolute error compared to baselines.

General Variational Autoencoder for Imbalanced Dataset | *UC Merced*

01/2024 - 05/2024

- Develop a general variational autoencoder (VAE) that leverages contrastive loss (InfoNCE) in the latent space to create robust and separable representations of the minority classes from an imbalanced image dataset.
- Introduce the orthogonal latent spaces into the VQ-VAE framework to separate the label-relevant (e.g, dog and cat) representations and label-irrelevant (e.g., background) representations in the latent space. Enhancing image content representation efficiency.

Transformer-Based Model for Activity Classification | *Columbia University*

12/2021 - 10/2022

- Conduct video downsampling and human pose extraction using OpenCV and detectron2
- Data augmentation by rotation using 3D human pose generated from VideoPose3D.
- Feature selection and dimensionality reduction using PCA and Slice Inverse Regression(SIR).
- Developed Transformer-Based algorithms to model the feature series for activity classification.

PUBLICATIONS

Shangjie Du*, Hui Wei*, Dong Yoon Lee, Zhizhang Hu, Shijia Pan. "Graph-Based Physics-Guided Urban PM2. 5 Air Quality Imputation with Constrained Monitoring Data." *ACM Transactions on Sensor Networks* (2025).

Shangjie Du, ZhiZhang Hu, and Shijia Pan. "GraPhy: Graph-Based Physics-Guided Urban Air Quality Modeling for Monitoring-Constrained Regions." *Proceedings of the 11th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation*. 2024 (**Best Paper Runner-Up**)

Yue Zhang*, **Shangjie Du***, Jiqing Wen, Robert Likamwa, Shiwei Fang, Shijia Pan. "PrivaSee: Augmented Reality-Enabled Privacy Perception Visualization for Internet of Things." *Proceedings of the 22nd Annual International Conference on Mobile Systems, Applications and Services*

ZhiZhang Hu*, **Shangjie Du***, Yuning Chen, Xuan Zhang, Wan Du, Asa Bradman, Shijia Pan. "Enhancing Fault Resilience of Air Quality Monitoring in San Joaquin Valley: A Data Equity Analysis." *Proceedings of the 21st ACM Conference on Embedded Networked Sensor Systems*. 2023.

TECHNICAL SKILLS

- Languages: Python, Matlab, R, LaTeX
- Tools: Pytorch, Huggingface-transformers, Deepspeed, OpenCV-Python, Sci-Kit Learn, pandas, Scipy, NumPy

HONORS AND REWARDS

- BuildSys 2024: Best Paper Runner-Up Award 2024
- MobiSys 2024: Best Poster Runner-Up Award 2024
- Columbia University Chair's List of Academic Achievements 2023
- Nanjing University People's Scholarship First Prize 2020
- Nanjing University People's Scholarship Third Prize 2019