Lijun Zhang

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WORK EXPERIENCES

Amazon Robotics, Seattle, WA, USA — June.2025 – Present

Postdoc Scientist

Summary: Conduct independent research bridging cutting-edge machine learning techniques with practical system-level applications.

Dolby Laboratories, Sunnyvale, CA, USA — May.2024-August.2024

PhD Research Intern

Summary: Create a universal solution to image restoration tasks with pre-trained diffusion models in a zero-shot manner.

- Designed an unsupervised learning-based image restoration framework to recover a given distorted image, e.g., blurry images or low-light images, using pre-trained image generation diffusion models.
- Restored details in distorted images even with complex distortion types, such as low-light blurry images, with real time performance.

Amazon Robotics, Seattle, WA, USA — May.2023-August.2023

Applied Scientist II Summer Intern

Summary: Design and provide multi-task solution to the multiple vision tasks involved in the Amazon Robotics Stow system.

- Designed a multi-task framework that can solve semantic segmentation, instance segmentation, depth estimation, and surface normal prediction simultaneously.
- Overcame the challenge from disjoint training datasets for different tasks and successfully constructed a multi-task model with high accuracy as single-task models and much lower latency and computations.

EDUCATION

University of Massachusetts, Amherst, Amherst MA, USA — Sept.2019 – May. 2025
Ph.D. in the College of Computer Science — Overall GPA: 4.0/4.0

Tongji University, Shanghai, China — Sept.2016 - Mar.2019
M.Sc. in Software Engineering — Overall GPA: 4.63/5.0

Tongji University, Shanghai, China — Sept.2012 - Jun.2016
B.Eng. in Software Engineering — Overall GPA: 4.78/5.0

RESEARCH INTERESTS

My research interests lie in *Automated Machine Learning Engineering and Computer Vision*. My current research focuses on developing multi-task models that achieve high task accuracy, small memory footprint, and low computation cost simultaneously for vision tasks. My previous works have spanned low-light image enhancement, image resolution, and image quality assessment.

PUBLICATIONS

- **Lijun Zhang**, Xiao Liu, Kaleel Mahmood, Caiwen Ding, Hui Guan, Attacking all tasks at once using adversarial examples in multi-task learning, in Neurocomputing, 2025.
- **Lijun Zhang**, Xiao Liu, Hui Guan, Reimagining Parameter Space Exploration with Diffusion Models, in EXAIT workshop at International Conference on Machine Learning (ICML), 2025.
- **Lijun Zhang**, Xiao Liu, Antoni Viros Martin, Cindy Xiong Bearfield, Yuriy Brun, Hui Guan, Attack-Resilient Image Watermarking Using Stable Diffusion, in Neural Information Processing Systems (NeurIPS), 2024.
- Kunjal Panchal, Nisarg Parikh, Sunav Choudhary, **Lijun Zhang**, Yuriy Brun, Hui Guan, Thinking Forward: Memory-Efficient Federated Finetuning of Language Models, in Neural Information Processing Systems (NeurIPS), 2024.
- Xiao Liu, **Lijun Zhang**, Hui Guan, Information-Enhanced Graph Neural Network for Transcending Homophily Barriers, IEEE Access 2024.
- Qizheng Yang, Tianyi Yang, Mingcan Xiang, **Lijun Zhang**, Haoliang Wang, Marco Serafini, Hui Guan, GMorph: Accelerating Multi-DNN Inference via Model Fusion, European Conference on Computer Systems (EuroSys), 2024.
- Kunjal Panchal, Sunav Choudhary, Nisarg Parikh, **Lijun Zhang**, Hui Guan, Flow: Per-instance Personalized Federated Learning, in Conference on Neural Information Processing Systems (NeurIPS), 2023.
- **Lijun Zhang**, Xiao Liu, Hui Guan, A Tree-Structured Multitask Model Architectures Recommendation System, IEEE Transactions on Neural Networks and Learning Systems (TNNLS), 2023
- **Lijun Zhang**, Qizheng Yang, Xiao Liu, Hui Guan, An Alternative Hard-Parameter Sharing Paradigm for Multi-Domain Learning, IEEE Access, 2023.
- **Lijun Zhang**, Xiao Liu, Hui Guan, AutoMTL: A Programming Framework for Automating Efficient Multi-Task Learning, in Conference on Neural Information Processing Systems (NeurIPS), 2022.
- **Lijun Zhang**, Xiao Liu, Hui Guan, A Tree-Structured Multi-Task Model Recommender, in International Conference on Automated Machine Learning (AutoML), 2022.
- **Lijun Zhang**, Qizheng Yang, Xiao Liu, Hui Guan, Rethinking Hard-Parameter Sharing in Multi-Domain Learning, in IEEE International Conference on Multimedia and Expo (ICME), 2022.
- **Lijun Zhang**, Hui Guan, Yufei Ding, Xipeng Shen, Hamid Krim, Reuse-centric K-means Configuration, in Information Systems, 2021.
- Hui Guan, Umang Chaudhary, Yuanchao Xu, Lin Ning, **Lijun Zhang**, and Xipeng Shen, Recurrent Neural Networks Meet Context-Free Grammar: Two Birds with One Stone, in IEEE International Conference on Data Mining (ICDM), 2021.
- Lin Zhang, **Lijun Zhang**, Xiao Liu, Ying Shen, Shengjie Zhao, Shaoming Zhang, Zero-Shot Restoration of Back-lit Images Using Deep Internal Learning, in ACM International Conference on Multimedia (ACM MM), 2019.
- **Lijun Zhang**, Lin Zhang, Xiao Liu, Ying Shen, and Dongqing Wang, Image exposure assessment: A benchmark and a deep convolutional neural networks based model, in IEEE International Conference on Multimedia and Expo (ICME), 2018.
- **Lijun Zhang**, Lin Zhang, and Lida Li, Illumination quality assessment for face images: a benchmark and a convolutional neural networks based model, in International Conference on Neural Information Processing (ICONIP), 2017.

PREPRINTS

- Xiao Liu, **Lijun Zhang**, Deepak Ganesan, Hui Guan, Communication-Efficient Multi-Device Inference Acceleration for Transformer Models, in ArXiv, 2025.
- Yuezhou Sun, Wenlong Zhao, **Lijun Zhang**, Xiao Liu, Hui Guan, Matei Zaharia, Toward Compact Parameter Representations for Architecture-Agnostic Neural Network Compression, in ArXiv, 2021.
- **Lijun Zhang**, Xiao Liu, Erik Learned-Miller, Hui Guan, SID-NISM: A Self-supervised Low-light Image Enhancement Framework, in ArXiv, 2020.

RESEARCH EXPERIENCES

Exploring Stable Diffusion Models Sept.2023-May.2025

Research Assistant, Advised by Prof. Hui Guan, MLSys Lab, UMass Amherst

Summary: Rapid evolution in deep generative models has led to methods capable of synthesizing high-quality, realistic images. As a representative, stable diffusion models become popular in both traditional and emerging computer vision tasks. We would like to explore whether powerful diffusion models could serve as an off-the-shelf tool for downstream tasks, and whether the philosophy of multi-task learning and the power of stable diffusion models could facilitate each other.

- Adapted well-trained stable diffusion models to image watermarking task without additional training process; our research demonstrates that stable diffusion is a promising approach to robust watermarking, able to withstand even stable-diffusion-based attacks. (A paper accepted to NeurIPS'24)
- Exploring possibility of efficiently generating parameters for multi-task models from single-task models, utilizing the generation power of stable diffusion models. (A paper accepted to EXAIT@ICML'25)

Programming Systems for Efficient Multi-Task Learning Oct.2020-June.2023

Research Assistant, Advised by Prof. Hui Guan, MLSys Lab, UMass Amherst

Summary: A fundamental challenge in multi-task learning is to determine the set of parameters to share across tasks to achieve the best performance for tasks. Existing manually designed network architectures and learning-based methods have limitations on either task performance or application generality. There is a strong need to develop programming systems for efficient multi-task learning that overcome current issues.

- Conducted an empirical study on how to share model parameters in multi-domain learning and concluded insights that challenge the common practice in hard parameter sharing and promote an alternative parameter sharing strategy as a stronger baseline. (A paper published on ICME'22, IEEE Acess'23)
- Designed a tree-structured multi-task models recommender that explore the architecture design space completely and automatically in a white-box manner via building recursive space enumerator and reliable task accuracy estimator; our recommended multi-task architectures are competitive with state-of-the-art under specified computation budgets. (A paper published on AutoML'22, TNNLS'23)
- Proposed a programming framework that largely automates architecture search of multi-task models given an arbitrary backbone model and a set of tasks via compiler support and policy-architecture co-training; the framework could identify compact multi-task models that outperform state-of-the-art approaches in task performance. (A paper accepted by NeurIPS'22)
- Analyzed the robustness of multi-task systems with existing single-task adversarial attacks and identified their limitations in ruining all the tasks at once; developed dynamic gradient balanced attack to efficiently attack all the tasks simultaneously; demonstrated the relationship between parameter sharing and adversarial vulnerability of multi-task models. (A paper accepted by Neurocomputing'25)

Zero-shot Low-light Image Enhancement Jan.2018-June.2020

Research Assistant, Advised by Prof. Erik G. Learned-Miller, Vision Lab, UMass Amherst

Prof. Lin Zhang, Computer Vision Lab, Tongji University

Summary: To get rid of the restriction of using training data when conducting image restoration via neural networks, it is necessary to design self-supervised image enhancement approaches to restore the quality of any single back-lit image only relying on the visual information of the image itself.

- Proposed a self-supervised image decomposition network based on Retinex Theory, an image decomposition theory, which takes a low-light image and its histogram equalization image as only inputs for image illumination extraction and noise removal. (A preprint posted on ArXiv'20)
- Modeled the S-curve adjustment procedure in the back-lit image restoration with Markov Random Field (MRF) and proposed the first self-supervised learning solution to estimate the S-curve parameters that best fit the back-lit image; as an image-specific framework with low computation cost, the proposed method could be applied to video stream directly. (A paper published on ACMMM'19)

No-reference Image Quality Assessment May.2018-Sept.2018

Research Assistant, Advised by Prof. Lin Zhang, Computer Vision Lab, Tongji University

Summary: No-reference image quality assessment aims to design computerized algorithms that can evaluate the quality of a given image without reference in consistency with the perception of human observers, which could be objective metrics for many image processing problems.

- Established an image exposure database containing real-scene images captured in various scenarios under seven exposure levels as well as artificial images generated via a proposed image illumination adjustment tool, based on which an algorithm towards automatic image exposure level assessment is designed as a baseline. (A paper published on ICME'18)
- Established a database of face images with various illumination patterns and proposed a CNN-based method to evaluate face images illumination quality in high consistency (SROCC 0.95) with human perception. (A paper published on ICONIP'17)

RECOGNITION

UMass CICS PhD Dissertation Writing Fellowship	UMass Amherst CICS, MA, 2024
IBM PhD Fellowship	IBM, 2023-2024
Scholar Award & Top Reviewer	NeurIPS, 2022
Travel Grant Award	Conf-AutoML, 2022
The Lori a. Clarke Scholarship	UMass Amherst CICS, MA, 2020
Best Undergraduate & Graduate Thesis	Tongji University, Shanghai, 2016 & 2019
Outstanding Graduates in Shanghai	Education Committee, Shanghai, 2016 & 2019
National Scholarship for Graduate Students	Ministry of Education, China, 2018