WANZHOU LIU

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RESEARCH INTERESTS

I am deeply interested in computer vision, focusing on representation learning, 3D spatiotemporal visual perception, multimodal language models, and generative models. I am passionate about both theoretical and practical innovations, valuing simplicity, efficiency, and scalability in impactful research.

EDUCATION

Washington University in St. Louis — **Aug. 2023 – est. May 2025**
M.S. in Computer Science | GPA: 3.89/4.0 — *St. Louis, Missouri, USA*

Qingdao University — **Sep. 2019 – May 2023**
B.E. in Software Engineering (Big Data Track) | GPA: 3.79/4.0 (Top 5%) — *Qingdao, Shandong, China*
Honors: First-Class Scholarship, Outstanding Student (Top 3%)

COURSEWORK

- Computer Vision ● Advanced Computer Vision ● Large Language Models ● Nonlinear Optimization Algorithms
- Machine Learning ● Deep Learning ● Hadoop, Zookeeper Programming ● Spark Real-time Computing ● Data Mining

PUBLICATIONS (*: equal contribution)

[A Project on LLM for Autonomous Driving] — **Nov. 2024**
Maolin Wei, **Wanzhou Liu***, Eshed Ohn-Bar*
Under Review

[A Project on NeRF Editing] — **Sep. 2024**
***Wanzhou Liu**, Zhexiao Xiong, Xinyu Li, Nathan Jacobs*
Under Review [arXiv to be released]

As Time Goes by: Dynamic Face Aging Method Using CycleGAN — **Jan. 2022**
Wanzhou Liu
International Conference on Computer Graphics, Artificial Intelligence, and Data Processing
(ICCAID), 2021 [doi.org/10.1117/12.2631420]

RESEARCH EXPERIENCES

Visiting Researcher, Human-to-Everything Lab, Boston University — **May 2024 – Present**
Advisor: **Prof. Eshed Ohn-Bar** — *Boston, MA*

● **Generalizable World Model for Autonomous Driving (Ongoing)**
- Developed an efficient fine-tunable generative model based on Stable Video Diffusion.
- Planned to integrate the capabilities of the large language models with our generative model, enabling traffic signals and participants within the world model to interact rather than merely serving as ineffective elements.

Research Assistant, Multimodal Vision Research Lab, Washington University — **Sep. 2023 – Present**
Advisor: **Prof. Nathan Jacobs** — *St. Louis, MO*

● **Generative-free Occlusion Removal in Neural Radiance Fields**
- Identified the challenges posed by occlusion removal in camera parameter estimation and designed a novel training approach leveraging camera parameter optimization to stabilize the training and rendering processes.
- Proposed a regularization method to mitigate overfitting issues in occluded regions caused by visibility constraints.
- Built a new occluded scene dataset with significant occlusions but visible background from other limited viewpoints, for future research.

Undergraduate Researcher, Qingdao University — **Aug. 2021 – Jun. 2022**
Advisor: **Prof. Gengxin Sun** — *Qingdao, China*

● **Multi-stage Progressive Face Aging Generation**
- Revealed the issue of the imbalanced representation of Asian facial data compared to other races in mainstream facial datasets such as CACD, IMDB-WIKI, and AGFW-v2.
- Transformed the single-stage generative model CycleGAN into a multi-stage, dynamically progressive facial aging framework through age vector control.

Technical Lead for College Business Elite Challenge, Qingdao University Mar. 2021 – Nov. 2021
*Advisor: **Prof. Xiquan Sun*** *Qingdao, China*

- **Development and Application of Artificial Intelligence Fresh Air System Based on LSTM**
  - Developed two fan power regulation systems using C and Python: one adjusted power based on real-time gas and temperature data, while the other employed an LSTM model to predict short-term air composition changes. Integrated both systems with weighted coordination for optimal performance.
  - Won the Second Prize in the National Finals of the 2021 China University Business Elite Challenge, ranking Top 316 among nearly 10,000 teams in the competition.

INTERNSHIP EXPERIENCE

Semiconductor Manufacturing International Corporation (SMIC) Jan. 2022 – Apr. 2022
Artificial Intelligence Intern *Shanghai, China*

- Utilized OpenCV to conduct image dataset preprocess for further object recognition and visual flaw detection.
- Performed the product surface defect detection task based on YOLO V5.

PROJECTS

Knowledge Distillation for Image Super-Resolution | *Python, PyTorch* **May 2024**

- Developed a distillation framework for single image super-resolution (SISR), to solve this task while maintaining low computational cost.
- The teacher network leverages high-resolution images and extracts compact features as the encoder, while the FSRCNN as the student network inherits reconstruction capability through feature distillation and imitation loss.
- Achieved substantial performance improvements over the original FSRCNN model while maintaining the same lightweight architecture.

Crime Data Analysis and Big Data Processing Using Spark | *Java, Scala, Spark* **Feb. 2022**

- Leveraged Apache Spark and Scala to process and analyze a large-scale official dataset from the Chicago Data Portal, focusing on computational efficiency and scalability.
- Executed comprehensive data preprocessing workflows for better analysis, including data cleaning, format transformations, and feature engineering.
- Employed distributed computing and in-memory processing techniques to handle queries on massive datasets.

TECHNICAL SKILLS

Programming Languages: Python, Java, C/C++, Hadoop, Spark

Techniques/Frameworks: Linux, Git, Docker, PyTorch, Diffusers, OpenCV, Carla, Blender

OTHER EXPERIENCES

Teaching Assistant - CSE 523S Systems Security, Washington University in St. Louis | Aug. 2024 – Dec. 2024
Member - Aperture Photography Club, Washington University in St. Louis | Sep. 2023 – Present
Member - Tinghai Reading Club, Qingdao University | Sep. 2022 – Present
Member - Public Welfare Association, Qingdao | Jun. 2021 – Present