Huimin Zeng

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Research Interest

My research focuses on general and interpretable computational photography, with a strong interest in 3D reconstruction and generative/interactive tasks. Previous research experience has concentrated on low-level vision, 3DGS and multimodal LLMs.

Selected Publications

- **Huimin Zeng**, Yue Bai and Yun Fu, "Arbitrary-Scale 3D Gaussian Super-Resolution with Diffusion Priors", Under Review. ArXiv:2508.16467
- **Huimin Zeng**, Jiacheng Li and Zhiwei Xiong, "Plug-and-Play Versatile Compressed Video Enhancement", **CVPR 2025**. Website
- **Huimin Zeng**, Jiacheng Li, Ziqiang Zheng and Zhiwei Xiong, "All-in-One Image Compression and Restoration", **WACV 2025** (**oral**). arXiv:2502.03649
- Ziqiang Zheng, Yiwei Chen, **Huimin Zeng**, Tuan-Anh Vu, Binh-Son Hua, Sai-Kit Yeung, "MarineInst: A Foundation Model for Marine Image Analysis with Instance Visual Description", **ECCV 2024** (**oral**). Website
- **Huimin Zeng**, Jie Huang, Jiacheng Li and Zhiwei Xiong, "Region-Aware Portrait Retouching with Sparse Interactive Guidance," IEEE Transaction on Multimedia (**TMM**), doi: 10.1109/TMM.2023.3262185
- **Huimin Zeng**, Weinong Wang, Xin Tao, Zhiwei Xiong, Yu-Wing Tai and Wenjie Pei, "Feature Decoupling-Recycling Network for Fast Interactive Segmentation," **ACM MM 2023**, doi/10.1145/3581783.3611837

Industry Experience

Sanofi

Full-time Research Intern *2025*

- *Mentor*: Dr. Wei Zhao & Dr. Yongjian Yang
- Evaluate the performance of MLLMs in pharmaceutical document understanding and reasoning.
- Discover the challenge of redundant tokens and limited resolution in long document scenarios.
- Develop a hierarchical token fragmentation mechanism for efficient understanding and reliable reasoning.

Microsoft Research Asia (MSRA)

Full-time Research Intern *2023*

- *Mentor*: Dr. Bin Li & Dr. Jiahao Li
- Assess the performance of image codecs under challenging scenarios (*e.g.,* degraded inputs and extreme-low bitrates)
- Reveal long-termly overlooked drawbacks of clean-data-specific codecs in handling degraded inputs.
- Develop general neural image codec with the restoration ability for degradations of different types and degrees.
- Part of this internship is accepted to **WACV 2025**.

Kuaishou Technology

Full-time Research Intern *2021*

- *Mentor*: Prof. Yu-Wing Tai & Weinong Wang
- Design the decoupling and recycling algorithm for efficient interactive segmentation.
- Deploy the efficient interactive segmentation algorithm on multiple lightweight backbones.
- Develop the interactive segmentation function of the Kuaiying APP.
- Part of this internship is accepted to **ACM MM 2023**.

Research Experience

HDR Novel View Synthesis with Physical Rendering and HDR Imaging

Boston, U.S.

Northeastern University *6/2025 - 10/2025*

- Existing HDRNVS methods primarily rely on camera ISP reconstruction procedures, ignoring the modeling of ambient-illumination-dependent appearance.
- We formulate HDRNVS as a combination of active and passive relighting tasks, and introduce a dual-branch framework that reconstructs the HDR field from both ISP and virtual light perspectives, enabling stable and physics-consistent HDR reconstruction.
- To address the premature deletion of 3DGS in over/under-exposed regions, we propose a gradient scaling strategy based on the exposure difference, thereby preserving critical scene information.
- Experimental results show our superior HDR detail capturing ability, promising quantitative improvements, and enhanced stability over existing methods.
- Ongoing project.

3D World Object-Interaction with MLLM Agent Collaboration

Boston, U.S.

Northeastern University *2/2025 - 6/2025*

- Existing 3D large-scale scene ignores the inner relationship between objects, suffering from isolated editing for object updates.
- We formulate the 3D world generation into multi-agent collaborative tasks with prompt-guided layout generation, scene reconstruction, object recomposition/harmonization, thereby enabling object-interaction and recomposition.
- To address inconsistencies in appearance and scale, we introduce a harmonization module that seamlessly blends scene components and supports prompt-based artistic control.
- The integrated 3D world considers rationality between objects and supports high-quality results across zoom/resolution levels.
- Ongoing project.

Arbitrary-Scale 3D Gaussian Super-Resolution with Diffusion Priors

Boston, U.S.

Northeastern University *9/2024 - 1/2025*

- Existing 3DGS-based high-resolution novel view synthesis (HRNVS) methods focus on upsampling with fixed scale factors (*e.g.,* $\times 2$ and $\times 4$), ignoring the intrinsic continuous characteristic of 3D world and the need to flexibly adjust rendering accuracy based on available resources.
- We make the first attempt to achieve 3D super-resolution of arbitrary scale factors with a single 3DGS model, providing a unified and efficient solution for flexible HRNVS.
- To enrich the details of the reconstructed 3D model, we explore the powerful generative priors (*i.e.,* StableSR), to refine the high-frequency details in the novel views and inject the generated structures into the 3D model.
- Extensive experiments demonstrate the superiority of our method in rendering high-quality super-resolved results, including non-integer scale factors.
- Under Review.

Education

Northeastern University *Boston, U.S.*
PhD. in Computer Engineering *09/2024 - Present*
- **Advisor:** Prof. Raymond Fu
- **Research topic:** 3D Vision, MLLMs

University of Science and Technology of China *Hefei, China*
M.S. in Information and Communication Engineering *09/2021 - 06/2024*
- **Advisor:** Prof. Zhiwei Xiong
- **Research topic:** Low-level Vision, Interactive Tasks

Ocean University of China *Qingdao, China*
B.S. in Electronic Information Engineering *09/2017 - 06/2021*
- **Advisor:** Prof. Haiyong Zheng & Prof. Zhibin Yu
- **Research topic:** Image/Video Generation, Underwater Image Enhancement

Teaching & Service

Teaching Assistant Undergraduate course "Object-Oriented Programming", "Data Structures".
Journal Reviewer TPAMI, TKDD, TMM, NPJ Artificial Intelligence
Conference Reviewer ACM MM 2023/2024, ECCV 2024, WACV 2025, CVPR 2025, AAAI 2026

Achievements & Awards

ChinaMM 2019 Underwater Image Enhancement Challenge (**Winner**) *2019*
2019 National Artificial Intelligence Challenge on 4K UHD HDR (**Top 15%**) *2020*
Outstanding Student Scholarship, USTC *2023/2022*
Outstanding Freshman Scholarship, USTC *2021*
The First Prize Scholarship, OUC *2018/2019/2020*
The Research and Innovation Scholarship, OUC *2019*

Programming

Languages Python, C, C++, Matlab, LaTeX, Markdown
Frameworks PyTorch, TensorFlow, Keras, OpenCV, PIL