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. Specifically, my research experience has concentrated on image/video enhancement, HDR inverse tone mapping, and super-resolution.

Selected Publications

- **Huimin Zeng**, Yue Bai and Yun Fu, "Arbitrary-Scale 3D Gaussian Super-Resolution with Diffusion Priors" Under Review.
- **Huimin Zeng**, Jiacheng Li and Zhiwei Xiong, "Plug-and-Play Versatile Compressed Video Enhancement" in Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition **CVPR 2025**.
- **Huimin Zeng**, Jiacheng Li, Ziqiang Zheng and Zhiwei Xiong, "All-in-One Image Compression and Restoration" in Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision **WACV 2025** (**oral**).
- 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," in The 18th European Conference on Computer Vision **ECCV 2024** (**oral**).
- **Huimin Zeng**, Weinong Wang, Xin Tao, Zhiwei Xiong, Yu-Wing Tai and Wenjie Pei, "Feature Decoupling-Recycling Network for Fast Interactive Segmentation," in Proceedings of the 31st ACM International Conference on Multimedia **ACM MM 2023**.
- **Huimin Zeng**, Jie Huang, Jiacheng Li and Zhiwei Xiong, "Region-Aware Portrait Retouching with Sparse Interactive Guidance," in IEEE Transactions on Multimedia (**TMM**), doi: 10.1109/TMM.2023.3262185.
- **Huimin Zeng**, Xinliang Zhang, Zhibin Yu and Yubo Wang, "SR-ITM-GAN: Learning 4K UHD HDR With a Generative Adversarial Network," in IEEE Access, vol. 8, pp. 182815-182827, 2020.

Work 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 Project

One world, Two Painters: Dual-branch HDR Novel View Synthesis

Northeastern University

Boston, U.S.
6/2025 - 10/2025

- Reconstructing from views of different exposures provides a cost-effective alternative for capturing HDR details in a 3D world. However, existing methods primarily rely on camera ISP reconstruction procedures, which limit the quality and optimization of HDR novel view synthesis (HDRNVS).
- 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 consistent HDR reconstruction.
- To address the premature deletion problem of 3D Gaussians 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 Composition and Stylization with Object-Interaction Reasoning

Northeastern University

Boston, U.S.
2/2025 - 6/2025

- Existing 3D large-scale scene reconstruction methods suffer from high memory usage and poor modularity for object editing or dynamic updates.
- We decompose the 3D world generation into prompt-guided layout generation, object/scene reconstruction/generation, 3D composition and stylization, thereby enabling dynamic recomposition and editing.
- 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 shows high scene flexibility, supporting high-quality results across zoom/resolution levels and modified scene layout.
- Ongoing project.

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

Northeastern University

Boston, U.S.
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
PhD. in Computer Engineering

Boston, U.S.
09/2024 - Present

- **Advisor:** Prof. Yun Raymond Fu
- **Research topic:** 3D Vision, Low-level Vision

University of Science and Technology of China
M.S. in Information and Communication Engineering

Hefei, China
09/2021 - 06/2024

- **Advisor:** Prof. Zhiwei Xiong
- **Research topic:** Low-level Vision, Interactive Tasks

Ocean University of China
B.S. in Electronic Information Engineering

Qingdao, China
09/2017 - 06/2021

- **Advisor:** Prof. Haiyong Zheng & Prof. Zhibin Yu
- **Research topic:** Image/Video Generation, Underwater Image Enhancement
- **GPA:** 3.86/4.0

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 2025/2026, ICCV 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 (Grade 1/ Grade 2)	*2023/2022*
Outstanding Freshman Scholarship (Grade 1)	*2021*
The First Prize Scholarship	*2018/2020*
The Second Prize Scholarship	*2019*
The Research and Innovation Scholarship	*2019*

Programming

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