

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**, 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.
- **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**.
- Qi Zhao, Ziqiang Zheng, **Huimin Zeng**, Zhibin Yu, Haiyong Zheng and Bing Zheng, “The Synthesis of Unpaired Underwater Images for Monocular Underwater Depth Prediction,” in Front. Mar. Sci. 8:690962, 2021.
- Xinliang Zhang*, **Huimin Zeng***, Xiang Liu, Zhibin Yu, Haiyong Zheng and Bing Zheng, “In Situ Holothurian Non-contact Counting System: A General Framework for Holothurian Counting,” in IEEE Access, vol. 8, pp. 210041-210053, 2020 (*equal contribution).
- Xinliang Zhang, Shu Yang, **Huimin Zeng**, Zhibin Yu, Haiyong Zheng and Bing Zheng, “In-situ Holothurian Non-contact Measurement based on Parallel Laser Beams and Semantic Segmentation,” Global Oceans 2020: Singapore – U.S. Gulf Coast, 2020, pp. 1-7.

Work Experience

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

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 prior (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.

Plug-and-Play Versatile Compressed Video Enhancement

Hefei, China

University of Science and Technology of China

11/2022 - 9/2024

- Compressed videos suffer from unsatisfying perceptual quality and lead to performance degradation in various downstream tasks.
- We introduce a versatile quality enhancement framework that adaptively enhances videos of different compression levels and assists various downstream vision tasks.
- Our approach takes advantage of the overlap between video coding and video quality enhancement. We reuse the off-the-shelf information embedded in the bitstream instead of estimating it from scratch, which contributes to the generalization ability and model performance.
- Extensive experiments demonstrate the effectiveness of our framework in assisting downstream tasks as a plug-and-play enhancement module, and outperforming existing quality enhancement methods in terms of performance and efficiency.
- Accepted to **CVPR 2025**.

All-in-one Image Compression and Restoration

Hefei, China

University of Science and Technology of China

5/2023 - 5/2024

- Image compression methods tailored for clean images tend to faithfully preserve undesired degradations for corrupted inputs, leading to a waste of bits and visually unpleasant results.
- We design a unified pipeline for all-in-one image compression and restoration, which models long-range dependencies and captures discriminative representations with a dual attention mechanism.
- Experimental results demonstrate the effectiveness of our method on various degradations without sacrificing the rate-distortion (RD) performance on clean data.
- This work equips the neural image codec with the restoration capability and improves its generalization ability against various degradations.
- Accepted to **WACV 2025 (oral)**

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

Hefei, China

M.S. in Information and Communication Engineering

09/2021 - 06/2024

- **Advisor:** Prof. Zhiwei Xiong
- **Research topic:** Image/Video Enhancement, 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
- **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, ICCV 2025

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