

Huimin Zeng

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Research Interest

My research is dedicated to the field of general and interpretable computational photography, with a strong interest in 3D vision, generative tasks and low-level vision. Specifically, my research experience has concentrated on 3D scene reconstruction, foundation models and image/video enhancement.

Education

Northeastern University

Boston, U.S.

PhD. in Computer Engineering

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

Selected Publications

- **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**, 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**, 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

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

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.
- We propose a simple framework for arbitrary-scale 3D Gaussian super-resolution, incorporating scale-aware rendering, diffusion prior-guided optimization, and progressive super-resolving to tackle the critical challenges of anti-aliasing rendering, constraining fine details of HR results, and maintaining structural consistency, respectively
- Extensive experiments demonstrate the superiority of our method in rendering high-quality super-resolved results, including non-integer scale factors.
- Under Review.

MarineInst: A Foundation Model for Marine Image Analysis with Instance Visual Description

Boston, U.S.

Northeastern University

12/2023 - 4/2024

- Existing foundation models (e.g., SAM and CLIP) confront challenges in terms of data distribution shift and intrinsic characteristics of marine visual data, leading to the failure of directly applying existing models to marine images, highlighting necessary modifications and domain-specific designs.
- We propose MarineInst, a powerful and flexible marine foundation model, which could perform the instance visual description task in an automatic or interactive manner. Our instance visual description task includes instance segmentation and instance captioning.
- We propose MarineInst20M, the largest documented marine image dataset to date, with remarkable visual diversity and semantic instance mask annotations.
- MarineInst trained on MarineInst20M demonstrates strong performance on various marine analysis tasks (e.g., object segmentation, semantic instance captioning and text-to-image synthesis).
- Accepted to ECCV 2024.

Teaching & Service

Teaching Assistant

Undergraduate course “Object-Oriented Programming”, “Data Structures”.

Journal Reviewer

TPAMI, TKDD, 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