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, low-level vision, and generative tasks. Specifically, my research experience has concentrated on 3D scene reconstruction, image/video enhancement, and interactive segmentation.

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, generative 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.

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.
- This work provides a feasible solution for compressed video enhancement in practical scenarios and shows various potential applications.
- Accepted to CVPR 2025.

Teaching & Service

Teaching Assistant Undergraduate course "Object-Oriented Programming", "Data Structures".
Journal Reviewer TPAMI, TKDD
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