Huimin Zeng

✉ zeng.huim@northeastern.edu | 🏠 zeldam1.github.io | in LinkedIn | 🎓 Google Scholar

Research Interest

My research is dedicated to the field of general and interpretable computational photography, with a strong interest in generative tasks and 3D vision. Specifically, my research experience has concentrated on diffusion-based scene reconstruction and generative adversarial networks.

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.,* extreme-low bitrates and degraded inputs).
- Evaluate the feasibility of applying pre-trained generative models (*e.g.,* latent diffusion, VQGAN and StyleGAN) for reconstructing compressed images.
- Develop a generative neural image codec for reconstructing image contents with extremely low bitrates.
- 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 Pior   *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.

Generative Prior based Image Compression for Extremely Low Bitrate Scenario   *Hefei, China*

University of Science and Technology of China   *11/2022 - 9/2024*

- Due to the traditional Rate-Distortion constraint, existing image compression methods suffer from the balance between perceptual quality and bitrates.
- We analyze the challenges and assess the performance of existing neural image codecs under extreme low-bitrates and severely degraded input scenarios.
- We introduce a generative prior-based image compression framework that leverages pre-trained generative SyleGAN to embed input images into bitrate-efficient latent vector, and reconstruct high-quality results at the decoder end.
- Extensive experiments demonstrate the effectiveness of our framework in reducing the bitrate, while providing visually satisfying reconstruction results.
- This work provides a feasible solution for compressed video enhancement in practical scenarios and shows various potential applications.
- Part of this project is accepted to WACV 2025.

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