

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 generative tasks and low-level vision. Specifically, my research experience has concentrated on diffusion models and foundation models.

Selected Publications

- **Huimin Zeng**, Yue Bai and Yun Fu, “Arbitrary-Scale 3D Gaussian Super-Resolution with Diffusion Prior” 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**, 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.
- 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

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.

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 StyleGAN 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.

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

M.S. in Information and Communication Engineering

Hefei, China

09/2021 - 06/2024

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