

Huairui Wang — Curriculum Vitae

Lab. of Intelligent Information Processing
School of Remote Sensing and Information Engineering, Wuhan University.
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Research Interests

- **Deep Learning Based Visual Signal Processing and Communications**
such as end-to-end optimized image/video compression and deep learning enhanced tools for hybrid coding framework, etc.
- **Video Processing**
such as video super resolution and video space-time super resolution, etc.

Education

- Bachelor Degree, (Intern in Lab. IIP. since 2018. Advisors: Associate Professor Daiqin Yang)
School of Remote Sensing and Information Engineering, **Wuhan University** 2015 – 2019
- Master Degree, (In Lab. IIP. Advisors: Professor Zhenzhong Chen)
School of Remote Sensing and Information Engineering, **Wuhan University** 2019 – 2021
- Ph.D Degree Candidate, (In Lab. IIP. Advisors: Professor Zhenzhong Chen)
School of Remote Sensing and Information Engineering, **Wuhan University** 2021 – Present

Project Experience

- **End-to-End Optimized Video Compression**
Research on video characteristics and efficient compression module for learned video compression. The research contents include:
 - Heterogeneous deformable compensation network for learned video compression
 - Utilizing long-range temporal information for video compression
 - Exploring bidirectional temporal information for video compression
- **End-to-End Optimized Image Compression**
Research on adaptive spatial aggregation and new technologies for learned video compression. The research contents include:
 - Dynamic kernel-based adaptive aggregation for learned image compression
 - Investigating masked image training for image compression
 - Exploring end-to-end image compression framework
- **Optimization of hybrid coding framework based on deep learning**
Research on deep learning based modules for hybrid coding framework. The research contents include:
 - Research on in-loop filter based on generative adversarial network and perception optimization
 - Research on in-loop filter based on Transformer architecture

○ Research and development of vehicle-road collaborative intelligent system

As the main person in charge of the school-enterprise cooperation project, I participated in and guided the construction and optimization of the intelligent system, and the development content include:

- Multi-thread road coordination back-end system construction and maintenance
- Vehicle behavior analysis algorithm based on real-time object detection algorithm
- Fast background modeling algorithm and abnormal object detection algorithm for monitoring scenes
- Development of traffic flow information sensing technology (real-time traffic statistics, lane-level traffic statistics, lane-level congestion detection)
- Guide the development of algorithms such as traffic accident monitoring, scene weather prediction, and model classification

○ Video Super-resolution

Research on deep learning based video super-resolution algorithm. The research contents include:

- Research on video frame reconstruction technology based on frequency decomposition processing
- Algorithm exploration and research based on non-local self-attention mechanism

Published Papers

1. **Huairui Wang**, Nianxiang Fu, Zhenzhong Chen, Shan Liu. Dynamic Kernel-Based Adaptive Spatial Aggregation for Learned Image Compression. Submitted to ACM Multimedia 2023, under review.
2. **Huairui Wang**, Zhenzhong Chen. Learned Video Compression using Temporal Information. Submitted to IEEE Transactions on Image Processing, in revision (AE decision: Review Again After Major Changes).
3. **Huairui Wang**, Zhenzhong Chen, Chang Wen Chen. Learned Video Compression via Heterogeneous Deformable Compensation Network. Submitted to IEEE Transactions on Multimedia, in revision (AE decision: Review Again After Major Changes).
4. **Huairui Wang**, Nianxiang Fu, Zhenzhong Chen. Efficient Learned Video Compression via Bidirectional Temporal Information Exploration. IEEE ISCAS 2023 (Lecture Session).
5. **Huairui Wang***, Guangjie Ren*, Tong Ouyang*, Junxi Zhang, Wenwei Han, Zizheng Liu, Zhenzhong Chen: Perceptual in-Loop Filter for Image and Video Compression. CVPR Workshop 2022. (*: Co-first Author)
6. **Huairui Wang**, Wanjie Sun, Zhenzhong Chen, Daiqin Yang: DOVE: Decomposition Oriented Video super-rEsolution. IEEE VCIP 2020 (Oral Presentation).
7. Yuantong Zhang, **Huairui Wang**, Han Zhu, Zhenzhong Chen: Optical Flow Reusing for High-Efficiency Space-Time Video Super Resolution. IEEE TCSVT 2022.
8. Yuantong Zhang, **Huairui Wang**, Zhenzhong Chen: Controllable Space-Time Video Super-Resolution via Enhanced Bidirectional Flow Warping. IEEE VCIP 2022.
9. Guangjie Ren, Feiyang Liu, **Huairui Wang**, Daiqin Yang, Tao Wang, Sihan Wang, Yunfei Zhang: Multi-objective optimization based perceptual bit allocation for gaming video coding in VVC. Signal Processing 2022.

Proposals

1. Haichuan Ma, Cunhui Dong, **Huairui Wang**, Haotian Zhang, Zhe Zhang, Han Zhu, Ding Ding, Li Li, Xiaozhong Xu, Shan Liu, Zhenzhong Chen, Dong Liu, "Response to the Call for Proposals on Neural Network-Based Image Coding by Team DwOTeo", VC-38-M326, Online, Jun. 2022. (Adopted)
2. Han Zhu, **Huairui Wang**, Feiyang Liu, Zhenzhong Chen, "EE2 Proposal: Exploration of joint loss function", VC-34-M294, Hainan, June, 2021.
3. Han Zhu, **Huairui Wang**, Feiyang Liu, Zhenzhong Chen, VC-34-M294, "EE2 Proposal: Exploration of joint loss function", Hainan, June, 2021.
4. Tong Ouyang, **Huairui Wang**, Han Zhu, Zhenzhong Chen "AHG11: Transformer based in-loop filtering", JVET-Y0081, Jan. 2022, Teleconference.

Honor and Award

- Second Class Outstanding Academic Scholarship of Wuhan University 2022
- Second prize in the National Mathematical Modeling Competition for Graduate Students 2022
- Outstanding Project of National University Student Scientific Research 2018
- Zhizhuo Scholarship of Wuhan University 2017

Technical and Personal skills

- **Programming Languages:** Python, C++, \LaTeX .
- **Foreign Languages:** Fluent in English.
- **Other:** Can write well organised and structured reports.