Xiao Wu

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Google Scholar (citations: 270+)

Education

University of Electronic Science and Technology of China (UESTC) *Ph.D. in Mathematics*
Advisor: Prof. Ting-Zhu Huang and Prof. Liang-Jian Deng *2023.09-Present*
Driving force of the team | Key team member

University of Electronic Science and Technology of China (UESTC) *M.Sc. in Artificial Intelligence*
Advisor: Prof. Ting-Zhu Huang and Prof. Liang-Jian Deng *2020.09-2023.06*
Driving force of the team | Key team member

Chongqing University of Posts and Telecommunications *B.Sc. in Intelligent Science and Technology*
Laboratory: Chongqing Key Laboratory of Computational Intelligence *2015.09-2019.06*
Advisor: Yucheng Shu
Student Team Leader

Research Experience

Water Cube3d - Research Intern 2020.03-2020.07

- Integrated image segmentation techniques into virtual reality programs and their installations
- Force estimation in 3D skeletal models

Laboratory of Computational Intelligence - Research Intern 2017.07-2019.07

- Medical image segmentation: weak-supervised learning, deformable convolution network, and edge-aware Techniques
- One paper was accepted by MICCAI 2019

Research Interest: Deep Learning and Mathematics

- Machine Learning (Deep Learning) and Optimization
  a) Deep Plug-and-Play, deep unfolding, deep equilibrium model, self-supervised learning
  b) Neural operator (e.g., implicit neural representation, physics-informed neural network, neural ordinary differential equation)
- Optimization (e.g., imaging inverse problem, tensor learning, sparse representation)
- Computer Vision and Image Processing
  a) Image enhancement, fusion, super-resolution, restoration
  b) Generative models: GAN, Flow, DDPM, SDE
  d) Medical image analysis

Publications

In Preparation

- **Xiao Wu**, Ting-Zhu Huang, Liang-Jian Deng, Zihan Cao. A Unified Perspective on Self-Attention Mechanism and Convolution. *In preparation.*

In Review

- **Xiao Wu**, Ting-Zhu Huang, Liang-Jian Deng, Zhong-Cheng Wu. A Robust Tensor Wheel Decomposition-Based Regularization method and Its Application to Image Completion. Journal of Scientific Computing (***JSC***). *Minor Revision.*

- **Xiao Wu**, Zihan Cao, Ting-Zhu Huang, Liang-Jian Deng, Jocelyn Chanussot, Gemine Vivone. Fully-Connected Transformer for Multi-Source Image Fusion. IEEE Transactions on Pattern Analysis and Machine Intelligence (***TPAMI***). *Major Revision.*
- Yu Zhong[1], **Xiao Wu**[1], Zihan Cao, Hong-Xia Dou, Liang-Jian Deng. SSDiff: Spatial-spectral Integrated Diffusion Model for Remote Sensing Pansharpening. Conference on Neural Information Processing Systems (***NeurIPS***), 2024. *Under Review.* (1 denotes the equal contribution)
- Gemine Vivone, Liang-Jian Deng, Dan-Feng Hong, Wei Li, Huanfeng Shen, **Xiao Wu**, el al. Deep Learning in Remote Sensing Image Fusion: Methods, Protocols, Data and Future Perspectives. IEEE Geoscience and Remote Sensing Magazine (***GRSM***). *Under Review.* **(Review)**

Accepted & Preprint

- Zihan Cao[1], **Xiao Wu**[1], Liang-Jian Deng, Yu Zhong. A Novel State Space Model with Local Enhancement and State Sharing for Image Fusion. Proceedings of the ACM International Conference on Multimedia (***ACM MM***), 2024.
- Yule Duan[1], **Xiao Wu**[1], Haoyu Deng, Liang-Jian Deng. Content-Adaptive Non-Local Convolution for Remote Sensing Pansharpening. Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (***CVPR***), 2024.
- **Xiao Wu**, Ting-Zhu Huang, Liang-Jian Deng, Tian-Jing Zhang. A Decoder-free Transformer-like Architecture for High-efficiency Single Image Deraining. International Joint Conferences on Artificial Intelligence (***IJCAI***), 2022. **(Long Oral, 3.7%)**
- **Xiao Wu**, Ting-Zhu Huang, Liang-Jian Deng, Tian-Jing Zhang. Dynamic Cross Feature Fusion for Remote Sensing Pansharpening. Proceedings of the IEEE/CVF International Conference on Computer Vision (***ICCV***), 2021. **(Poster)**
- Yucheng Shu, **Xiao Wu**, Weisheng Li. LVC-Net: Medical image segmentation with noisy label based on local visual cues. International Conference on Medical Image Computing and Computer-Assisted Intervention (***MICCAI, first author (excluding supervisor)***), 2019. **(Early Accept)**
- Haoyu Deng, Zijing Xu, Yule Duan, **Xiao Wu**, Wen-Jie Shu, Liang-Jian Deng. Exploring the Low-Pass Filtering Behavior in Image Super-Resolution. International Conference on Machine Learning (***ICML***), 2024.
- Zihan Cao, **Xiao Wu**, Liang-Jian Deng. Neural Shrödinger Bridge Matching for Pansharpening. Arxiv, 2024.
- Wen-Jie Shu, Hong-Xia Dou, Rui Wen, **Xiao Wu**, Liang-Jian Deng. CMT: Cross Modulation Transformer with Hybrid Loss for Pansharpening. IEEE Geoscience and Remote Sensing Letters (***GRSL***), 2024.
- Ran Ran, Liang-Jian Deng, **Xiao Wu**, Tian-Jing Zhang, Jian-Long Chang Qi-Tian. KNLConv: Kernel-space Non-local Convolution for Hyperspectral Image Super-resolution. IEEE Transactions on Multimedia (***TMM***), 2024.
- Zihan Cao, Shiqi Cao, Liang-Jian Deng, **Xiao Wu**, Junming Hou, Gemine Vivone. Diffusion model with disentangled modulations for sharpening multispectral and hyperspectral images. Information Fusion, 2023.
- Jun-Da Wang, Liang-Jian Deng, Chen-Yu Zhao, **Xiao Wu**, Hong-Ming Chen, Gemine Vivone. Cascadic Multi-Receptive Learning for Multispectral Pansharpening. IEEE Transactions on Geoscience and Remote Sensing (***TGRS***), 2023.
- Siran Peng, Chenhao Guo, **Xiao Wu**, Liang-Jian Deng. U2Net: A General Framework with Spatial-Spectral-Integrated Double U-Net for Image Fusion. Proceedings of the ACM International Conference on Multimedia (***ACM MM***), 2023.
- Shang-Qi Deng, Liang-Jian Deng, **Xiao Wu**, Ran Ran, Rui Wen. Bidirectional Dilation Transformer for Multispectral and Hyperspectral Image Fusion. International Joint Conferences on Artificial Intelligence (***IJCAI***), 2023.
- Jin-Liang Xiao, Ting-Zhu Huang, Liang-Jian Deng, Zhong-Chen Wu, **Xiao Wu**, Gemine Vivone. Variational pansharpening based on coefficient estimation with nonlocal regression. IEEE Transactions on Geoscience

and Remote Sensing (***TGRS***), 2023.

- Xue-Rui Qiu[1], Zhao-Rui Wang[1], Zheng Luan[1], Rui-Jie Zhu, **Xiao Wu**, Ma-Lu Zhang, Liang-Jian Deng. VTSNN: A Virtual Temporal Spiking Neural Network. Frontiers in Neuroscience, 2023.
- Rui Wen, Liang-Jian Deng, Zhong-Cheng Wu, **Xiao Wu**, Gemine Vivone. A Novel Spatial Fidelity with Learnable Nonlinear Mapping for Panchromatic Sharpening. IEEE Transactions on Geoscience and Remote Sensing (***TGRS***), 2023.
- Shang-Qi Deng, Liang-Jian Deng, **Xiao Wu**, Ran Ran, Dan-Feng Hong, Gemine Vivone. PSRT: Pyramid Shuffle-and-Reshuffle Transformer for Multispectral and Hyperspectral Image Fusion. IEEE Transactions on Geoscience and Remote Sensing (***TGRS***), 2023.
- Liang-Jian Deng, Ran Ran, **Xiao Wu**, Tian-Jing Zhang. Research progress on convolutional neural network methods for pan-sharpening of remote sensing images. Chinese Journal of Image and Graphics, 2022. **(Review)**
- Zhi-Xuan Chen[1], Cheng Jin[1], Tian-Jing Zhang, **Xiao Wu**, Liang-Jian Deng. SpanConv: A New Convolution via Spanning Kernel Space for Lightweight Pansharpening. International Joint Conferences on Artificial Intelligence (***IJCAI***), 2022. **(Long Oral, 3.7%)**
- Yudong Wang, Liang-Jian Deng, Tian-Jing Zhang, **Xiao Wu**. SSconv: Explicit Spectral-to-Spatial Convolution for Pansharpening. Proceedings of the ACM International Conference on Multimedia (***ACM MM***), 2021. **(Poster)**
- Cheng Jin, Rui-Jie Zhu, **Xiao Wu**, Liang-Jian Deng. SIT: A Bionic and Non-Linear Neuron for Spiking Neural Network. Arxiv, 2022.

Projects

- Pytorch Toolbox
  - UDL-VIS (A unified AutoDL framework for computer vision):
    - Faster library loading speed based on reflection mechanism
    - UDL is based on MMCV which provides various functionalities
    - UDL is based on NNI to perform automatic machine learning
    - UDL provides distributed computing based on Accerlerate (huggingface) and Pytorch implementation
  - PanCollection (Public remote sensing image pansharpening dataset and toolbox)
  - Image deraining
  - Multi-source image fusion (Multispectral-visible, multispectral-hyperspectral, visible-infrared image fusion) is coming soon
    - The first edition has been released
- MATLAB Toolbox
  - Tensor decomposition
  - Toolbox for multi-source image fusion benchmark is coming soon

Academical Activities

- Reviewer
  - NeurIPS 2024, IJCAI 2024, CVPR 2024, MICCAI 2024, ICPR 2024, ...
  - IEEE TGRS, IEEE JSTARS, IEEE GRSL, ...
- Presentation
  - ICCV 2021, IJCAI 2022, IJCAI 2023

Selected Honors & Awards

Special Postgraduate Scholarship of Science
Best Master Thesis Award
Best Bachelor Thesis Award
Academic Scholarship
Third Prize · National Huawei Cup Graduate Mathematical Modeling Competition
Third Prize · National Discovery Cup
Leader · Undergraduate Innovation and Entrepreneurship Training Program in Provinces

Skills

Progamming Language: Python (Pytorch, TensorFlow) with 7 years, Matlab, C, CUDA
Tools: Linux, Docker, Slurm, Origin, etc.
Language: Mandarin, English (CET-6)