

# ZHENG GANG WANG

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## EDUCATION

### B.Eng. in Artificial Intelligence

Southwestern University of Finance and Economics Chengdu, China | Sep 2023 – Jun 2027

- GPA: 86/100 | Rank: Top 15% (30/196)
- National Scholarship (2025)
- School-Level Scholarship (2023, 2024)
- IELTS: Scheduled (Expected Sep. 2026)
- Research Interests: Computer Vision || Representation Learning || Multimodal Learning



## PUBLICATIONS

**[ICML 2026] Wang, Z., Wang, W. (corresp.), Liang, H., & Jiang, T. Butterworth as Attention: Anisotropic Spectral Gating for Pansharpening. *International Conference on Machine Learning (ICML 2026)*.**

- ❖ **Observation:** Naively transplanting spatial operators (CNN, ViT) into the frequency domain is structurally inappropriate. Each spectral coordinate encodes a specific frequency component, and spectral energy follows a highly non-uniform radial distribution.
- ❖ **Theoretical Contribution:** Deriving a closed-form equivalence between Butterworth filtering and self-attention, replacing  $O(N^2)$  Softmax with  $O(N \log N)$  Sigmoid-gated frequency mask (log cutoff as Query, filter order as Key).
- ❖ **Technical Innovation:** Extended isotropic filter to learnable anisotropic elliptical passband, enabling direction-aware spectral modulation for pansharpening.
- ❖ **Impact:** Achieves SOTA performance on multiple pansharpening benchmarks with a lightweight model footprint; outperforming spatial and frequency domain competitor on cifar-100, validating the paradigm's broader applicability.

## RESEARCH EXPERIENCE

Research Assistant • Nice Lab, SWUFE Chengdu, China | 2025 – Present

- ❖ Led the design of novel deep learning architectures for remote sensing image fusion, focusing on frequency-domain representation learning and optimization-inspired neural networks.
- ❖ Proposed the core algorithms behind ABFNet (ICML 2026) and OSSNet (under review).
- ❖ Conducted theoretical analysis, model implementation, large-scale experiments, ablation studies, and manuscript preparation.

## SELECTED PROJECTS

**OSSNet: Orthogonal Spectral-Spatial Sketch Unfolding for Pansharpening • Under Review | 2026 – Present**

- ❖ Formulated pansharpening as low-dimensional orthogonal sketch learning via optimization unfolding, significantly reducing computational overhead.
- ❖ Introduced Legendre Spectral-Gating Sketch, a learnable orthogonal projection operator that dynamically constructs sketch subspaces from Gram covariance using Legendre polynomial recurrence and Schulz orthogonalization.
- ❖ Designed an Adjoint-Guided Data Consistency Compensation module together with explicit Null-Space Residual Recovery, yielding an interpretable degradation-aware reconstruction pipeline grounded in physical observation models.
- ❖ Achieved SOTA performance on multiple pansharpening benchmarks with substantially lower computational cost than existing unfolding-based methods.