Yongyi Wu

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Research Interests: Continual Learning, diffusion model, AI Agent

Education

Xi'an Jiaotong University Sep 2022 – Jun 2026

B.E. in Biomedical Engineering
GPA: 87.6 / 100 (Rank: Top 15%)
Selected Coursework: Linear Algebra (97) | Mathematics (88) | Programming Fundamentals (96) | Physics (93) | Pattern Recognition & Machine Learning (91) | Intelligent Medical Diagnosis (94) | Digital Electronics (99)

Publications & Preprints

Eigen-Directed Random Projection for Medical Image Class Incremental Learning
First Author *Accepted by* ***MICCAI 2026*** Dec 2025 – Feb 2026

- **Problem:** Addressed privacy-constrained class incremental learning in medical imaging, where historical patient data cannot be retained and highly similar disease categories are easily entangled in feature space.
- **Method:** Proposed **EDRP**, a training-free dual-view framework with a data-aware feature-guided projection mechanism that enlarges inter-class margins along principal directions while preserving fine-grained discriminative information.
- **Results:** Achieved strong performance across multiple medical benchmarks including Skin8, MedMNIST-Sub, PBC, and ChestX, while reducing memory overhead and demonstrating high robustness in clinically challenging settings.

From Generic to Dedicated: A Novel Optimizer for Online Continual Learning
First Author *Accepted by* ***NeurIPS 2026*** Sep 2025 – May 2026

- **Problem:** Studied the stability–plasticity dilemma in online continual learning, where models must adapt to non-stationary data streams under strict single-pass constraints.
- **Method:** Introduced **SPIN**, an interpolation-based optimizer that maintains dual parameter trajectories for rapid adaptation and stable consolidation, enabling more reliable optimization under streaming data.
- **Results:** Consistently improved performance across **11 mainstream online continual learning algorithms** on four benchmarks like CIFAR-100 and Tiny-ImageNet.

Research Experience

Research Assistant (Full-time), The University of Hong Kong Aug 2026 – Present

Advisor: Prof. Lequan Yu

- **Pixel-Space Diffusion for Text Rendering:** Investigating pixel-space diffusion models for high-fidelity text rendering, with a focus on improving the generation of small-scale and fine-grained textual content in images. *(Collaborators: ByteDance Seedance, CityU, Harvard, USTC)*
- **Evidence-Guided Medical AI Agent:** Developing an abnormality-grounding framework that learns reusable visual inspection strategies from limited expert annotations by integrating localization feedback, external medical knowledge, and visual references for frozen vision-language models.
  (Collaborators: XJTU, CUHK, Harvard)

Research Intern, Xi'an Jiaotong University & Harvard University Oct 2025 – Aug 2026

Advisors: Prof.Hong Wang (XJTU); Dr.Yichen Wu (Harvard)

- Conducted a comprehensive benchmark study evaluating pretrained-based CIL methods on medical imaging datasets, revealing that an earlier analytic classifier-based method consistently outperforms more recent alternatives.
- Traced the failure mode to the geometric mismatch between isotropic random projections and anisotropic medical feature distributions; designed and implemented the full **EDRP** pipeline (spectral decomposition, dual-view projection construction, analytic classifier update) to address it.
- Conducted ablation studies and theoretical margin analysis to validate the proposed design, achieving state-of-the-art results across four medical benchmarks with significantly reduced memory overhead.

Research Intern, University of Houston & Ohio State University Aug 2025 – May 2026

Advisor: Prof.Sen Lin

- Observed significant performance gaps between SGD and AdamW across existing OCL methods, motivating a systematic investigation into optimizer design as an underexplored factor in online continual learning.
- Connected stochastic averaging theory to the stability–plasticity dilemma and developed **SPIN**, an interpolation-based optimizer that maintains coupled plasticity and stability parameter sequences.
- Validated SPIN across 11 OCL algorithms on four benchmarks; demonstrated consistent gains in both replay-based and rehearsal-free settings with memory overhead comparable to SGD+EMA.

Technical Skills

- **Programming:** Python (PyTorch)
- **Research Areas:** Continual Learning, AI Agents, Medical Image Analysis
- **Research Skills:** Reading, reproducing, and analyzing SOTA research; being familiar with Claude Code.

Honors and Awards

Third Prize, National Biomedical Engineering Innovation Design Competition
Taifaxiang Scholarship (Top 5%)
Outstanding Student of Xi'an Jiaotong University
University Second and Third Class Scholarship
National Undergraduate Innovation Program Completion