

Yuyang Sun

✉ frontsea040320@gmail.com | Age 22 | Male

Education

University of Science and Technology of China 985 211

Expected Enrollment: Sept. 2026

Incoming Ph.D. Student in Software Engineering, School of Software Engineering

Huazhong Agricultural University 211

Sept. 2022 – Jun. 2026

B.S. in Information and Computing Science, College of Informatics

Weighted Average: 84.32

Research

Publications

Advanced Intelligent Text Creation via LLM Multi-Agent Interaction

Research Intern at TJU

Junchuan Yu#, Yuyang Sun#. “WRitEer: A Multi-Objective, Preference-Driven Multi-Agent Framework for Human-Like Advanced Text Generation.” Accepted by AAAI 2026. # Co-first Author; * Corresponding Author

- Proposed WRitEer, an LLM-based multi-agent framework for advanced text generation that reduces reliance on manual intervention and rule engineering by reformulating human-like text generation as a multi-objective optimization problem.
- Designed genetic-algorithm-inspired LLM operators to iteratively approximate Pareto-optimal solutions, used the iterative process to construct preference data, and applied DPO to fine-tune the generative model within a generation-evolution-evaluation loop, enabling model self-evolution toward more targeted human-like text generation.

Medical Fracture Detection Based on Regional Selective Attention

Yuyang Sun, Junchuan Yu, Cuiming Zou. “Enhanced Fracture Diagnosis Based on Critical Regional and Scale Aware in YOLO.” Accepted by IJCNN 2025.

- Proposed CRSelector, a regional selective attention mechanism inspired by stretch-based image editing, using global texture cues to guide a learnable deformable offset field that spatially warps feature maps and adaptively aligns receptive fields with irregular fracture regions.
- Combined binarized masks with self-attention to enhance critical regions and suppress background interference; designed the scale-aware detection head ScA to dynamically weight multi-scale features, achieving clear advantages over multiple baseline methods for fractures of varying sizes.

Ongoing Projects

A Unified Flow Matching Framework for Sparse Omics Enhancement

Research Intern at USTC

Yuyang Sun, Yimin Fan, Jiaming Ma, Jiachang Zhan, Pingxing Wang, Zhe Zhao, Yu Li, and Lei Li. “scUniFlow: A Unified Flow Matching Framework for Sparse Omics Enhancement.” Submitted to NeurIPS 2026.

- Proposed an endpoint-parameterized conditional Flow Matching framework for single-cell multimodal sparse enhancement, unifying scRNA-seq read-depth enhancement, spatial gene imputation, and scATAC-seq chromatin accessibility imputation.
- Designed biology-prior-guided Hilbert feature ordering and a structured Mamba backbone with bidirectional row/column state-space scans; outperformed existing methods on PBMC68k, Mouse Brain Visium, and 10x Multiome Mouse E18 while reducing oversmoothing and preserving cell-type-specific regulatory signals.

Learning Single-Cell Developmental Dynamics with Target-State Flow Matching

Research Intern at USTC

Yuyang Sun, Jiaming Ma, Jiachang Zhan, Pingxing Wang, Zhe Zhao, Yu Li, Yimin Fan, and Lei Li. “Learning Single-Cell Developmental Dynamics with Target-State Flow Matching.” Submitted to NeurIPS 2026.

- Proposed scFiT, a target-state Flow Matching framework for temporal single-cell RNA-seq population snapshots, directly predicting endpoint gene-expression states such that generated cells remain interpretable and can be supervised at the population-distribution level.
- Designed source-target relational time encoding with AdaLN Transformer conditioning and online entropy-regularized OT training; outperformed scNODE, PRESCIENT, and MIOFlow on interpolation and extrapolation across four cross-species developmental datasets while better reproducing cell-fate composition dynamics.

Hierarchical Memory-Augmented Multi-Expert Learning for Long-Tailed Recognition

Research Intern at USTC

Yuyang Sun, Senyang Su, Xiaotian Wang, Pengkun Wang, and Yang Wang. “MemTailor: Hierarchical Memory-Augmented Multi-Expert Learning for Long-Tailed Recognition.” Submitted to NeurIPS 2026.

- Proposed MemTailor, coupling external class-aware memory with a frequency-aware multi-expert visual backbone to mitigate the systematic forgetting of tail-class evidence under head-class-dominated gradients.
- Designed hierarchical class-aware memory with momentum prototypes, bounded instance slots, inverse-frequency capacity allocation, and uncertainty-gated memory correction; outperformed strong baselines on CIFAR-100-LT, ImageNet-LT, iNaturalist 2018, and Places-LT, especially on few-shot classes.

Improving Complex Instruction Following in Text-to-Image Generation with Multi-Agent Collaboration and Evolutionary Optimization

Research Intern at TeleAI

Yuyang Sun, Zhe Cheng, Shihao Xie, et al. “ArtisanEvo: Autonomous Evolutionary Inference for Semantic-Constrained Text-to-Image Generation.” Planned submission to AAAI 2027.

- Formulated complex text-to-image generation as a black-box discrete optimization problem under multidimensional semantic constraints, addressing failure modes in multi-object presence, attribute binding, counting, and spatial/non-spatial relations.
- Proposed ArtisanEvo, a training-free inference-time evolutionary optimization framework with semantically structured initialization, elite selection, dimension-aware crossover, and reflection-guided mutation, forming a generation-evaluation-reflection-evolution prompt-optimization loop.
- Built the 1,000-instruction S-CI Dataset and proposed Precision Semantic Match (PSM), a fine-grained metric auditing object, color, shape, material, count, and spatial/non-spatial relation fidelity.
- Substantially improved VQA and PSM on GPT-Image-1-mini, with consistent gains across Stable Diffusion v1.5, Flux-2, and GPT-Image-1-mini, demonstrating model-agnostic generalization across diverse backbone architectures.

scBrain: Residual Hierarchical Decoding for Spatial Cell-Type Annotation

Research Intern at USTC

Jiaming Ma, Jiachang Zhan, Pingxing Wang, **Yuyang Sun**, Yimin Fan, Zhe Zhao, and Lei Li. “scBrain: Residual Hierarchical Decoding for Spatial Cell-Type Annotation.” Submitted to NeurIPS 2026.

- Benchmarked 10+ baselines for hierarchical brain cell-type annotation on large-scale MERFISH spatial transcriptomics data, covering single-cell foundation models (Geneformer, scGPT, UCE, scFoundation) and classic discriminative/annotation-transfer methods (XGBoost, SVM, CellTypist, TACCO).
- Adapted frozen and fine-tuned transfer pipelines with model-specific gene tokenization, expression binning, and cross-species vocabulary alignment; maintained unified donor-split evaluation across SEA-AD, Kukanja MS, and Kukanja EAE.
- Evaluated Macro-F1, Micro-F1, and one-vs-rest AUC-ROC at Class, Subclass, and Supertype levels, identifying systematic degradation of frozen foundation models at fine-grained supertype resolution.

Heuristic Algorithm Design by Fusing Large Language Models with Scientific Literature

Research Intern at USTC

Zhe Zhao, HaiBin Wen, Dongting Xie, **Yuyang Sun**, Pengkun Wang, Fei Liu, Zhenkun Wang, Bo An, Qingfu Zhang, Yang Wang. “Fusing LLMs with Scientific Literature for Heuristic Discovery.”

- Proposed KA-EAD, a knowledge-augmented evolutionary algorithm design framework, to address the tendency of LLM-based heuristic discovery methods such as EOH and ReEvo to rely on static internal knowledge, reproduce existing heuristics, and get trapped in local optima on specialized NP-hard optimization tasks.
- Constructed a domain-specific scientific literature knowledge base with paper chunking, vector encoding, and FAISS indexing; designed short-/long-term reflection and a dynamic RAG operator that converts algorithmic bottlenecks into targeted literature queries and injects retrieved evidence into LLM-driven initialization, crossover, mutation, repair, and regeneration.
- Formed an automated evaluate-reflect-retrieve-generate-validate loop, outperforming EOH and ReEvo on GA for TSP50, LEHD for TSP1000, and 15 NP-hard optimization problems while mitigating search stagnation and premature convergence.