Weiwei Sun

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Overview

Homepage	🔖	https://sunnweiwei.github.io/
Google Scholar	🔖	https://scholar.google.com/citations?user=hdUZbxgAAAAJ&hl=en

Research 🔖 My recent research focuses on LLM agents for long-horizon tasks such as software engineering (SWE), algorithm development and deep research. I have trained agents that actively manage context [1] and collaborate with users in a proactive and personalized manner [2]. I have designed agents for automated machine learning engineering and algorithm search [3], [4]. I have also worked on LLM behavior attribution and transparency [5], as well as retrieval-augmented generation (RAG) and generative search [6], [7].

Education

2024.8 – now 🔖 **Carnegie Mellon University**
PhD in Language Technologies Institute
Supervisor: Prof. Yiming Yang

2017.9 – 2023.12 🔖 **Shandong University**
B.S. and M.S. in Computer Science and Technology
Supervisor: Prof. Zhaochun Ren

Research Experience

2024.8 – now 🔖 **Carnegie Mellon University.** Pittsburgh.
Research Assistant | Advisor: Yiming Yang.
Research: LLM Agent, AI4Science.

2025.5 – 2025.8 🔖 **ByteDance Seed.** San Jose.
Research Intern | Mentor: Jiecao Chen.
Research: LLM Agent, RL.

2024.7 – 2024.8 🔖 **Vector Institute.** Toronto.
Research Intern | Mentor: Colin Raffel.
Research: Training Data Attribution.

2024.3 – 2024.7 🔖 **University of Amsterdam.** Amsterdam.
Research Assistant | Mentor: Maarten de Rijke.
Research: Generative Retrieval.

2022.9 – 2023.12 🔖 **Baidu Inc.** Beijing.
Research Intern | Mentor: Dawei Yin.
Research: LLMs for Search.

2021.3 – 2021.9 🔖 **JD.com.** Beijing.
Research Intern | Mentor: Hongshen Chen.
Research: Question Answering.

2019.9 – 2021.3 🔖 **Shandong University.** Qingdao.
Research Assistant | Mentor: Zhaochun Ren.
Research: RAG, LLM Evaluation.

Publications /Google Scholar

1. **Weiwei Sun**, M. Lu, Z. Ling, K. Liu, X. Yao, Y. Yang, and J. Chen, "Scaling long-horizon llm agent via context-folding," in *arXiv*, 2025. 🔗 URL: https://arxiv.org/abs/2510.11967.

2. **Weiwei Sun**, X. Zhou, W. Du, X. Wang, S. Welleck, G. Neubig, M. Sap, and Y. Yang, "Training proactive and personalized llm agents," in *arXiv*, 2025. 🔗 URL: https://arxiv.org/abs/2511.02208.

3. S. Li*, **Weiwei Sun***, S. Li, A. Talwalkar, and Y. Yang, "Toward community-driven agents for machine learning engineering," in *MTI-LLM@NeurIPS*, 2025. 🔗 URL: https://arxiv.org/abs/2506.20640.

4. **Weiwei Sun**, S. Feng, S. Li, and Y. Yang, "Co-bench: Benchmarking language model agents in algorithm search for combinatorial optimization," in *AAAI*, 2026. 🔗 URL: https://arxiv.org/abs/2504.04310.

5. **Weiwei Sun**, H. Liu, N. Kandpal, C. Raffel, and Y. Yang, "Enhancing training data attribution with representational optimization," in *NeurIPS*, 2025, *Spotlight*. 🔗 URL: https://arxiv.org/abs/2505.18513.

6. Y. Chen, L. Yan, **Weiwei Sun**, X. Ma, Y. Zhang, S. Wang, D. Yin, Y. Yang, and J. Mao, "Improving retrieval-augmented generation through multi-agent reinforcement learning," in *NeurIPS*, 2025. 🔗 URL: https://arxiv.org/abs/2501.15228.

7. **Weiwei Sun**, K. Kong, X. Ma, S. Wang, D. Yin, M. de Rijke, Z. Ren, and Y. Yang, "Zerogr: A generalizable and scalable framework for zero-shot generative retrieval," in *arXiv*, 2025. 🔗 URL: https://arxiv.org/abs/2510.10419.

8. S. Feng*, **Weiwei Sun***, S. Li, A. Talwalkar, and Y. Yang, "Frontierco: A comprehensive evaluation of contemporary machine learning solvers for combinatorial optimization," in *AI4MATH@ICML*, 2025. 🔗 URL: https://arxiv.org/abs/2505.16952.

9. **Weiwei Sun**, Z. Shi, J. Wu, L. Yan, X. Ma, Y. Liu, M. Cao, D. Yin, and Z. Ren, "Mair: A massive benchmark for evaluating instructed retrieval," in *EMNLP*, 2024. 🔗 URL: https://arxiv.org/abs/2410.10127.

10. **Weiwei Sun**, Z. Chen, X. Ma, L. Yan, S. Wang, P. Ren, Z. Chen, D. Yin, and Z. Ren, "Instruction distillation makes large language models efficient rankers," in *CCIR and GenRec@CIKM*, 2023. 🔗 URL: https://arxiv.org/abs/2311.01555.

11. **Weiwei Sun**, L. Yan, Z. Chen, S. Wang, H. Zhu, P. Ren, Z. Chen, D. Yin, M. de Rijke, and Z. Ren, "Learning to tokenize for generative retrieval," in *NeurIPS*, 2023. 🔗 URL: https://openreview.net/pdf?id=UKd6dpVGdu.

12. **Weiwei Sun**, L. Yan, X. Ma, S. Wang, P. Ren, Z. Chen, D. Yin, and Z. Ren, "Is chatgpt good at search? Investigating large language models as re-ranking agents," in *EMNLP*, 2023, ***Outstanding paper award***. 🔗 URL: https://arxiv.org/abs/2304.09542.

13. **Weiwei Sun**, H. Cai, H. Chen, P. Ren, Z. Chen, M. de Rijke, and Z. Ren, "Answering ambiguous questions via iterative prompting," in *ACL*, 2023, pp. 7669–7683. 🔗 URL: https://arxiv.org/abs/2307.03897.

14. **Weiwei Sun**, P. Ren, and Z. Ren, "Generative knowledge selection for knowledge-grounded dialogues," in *Findings of EACL*, 2023, pp. 2077–2088. 🔗 URL: https://arxiv.org/abs/2304.04836.

15. **Weiwei Sun**, Z. Shi, S. Gao, P. Ren, M. de Rijke, and Z. Ren, "Contrastive learning reduces hallucination in conversations," in *AAAI*, 2023, pp. 13 618–13 626. 🔗 URL: https://arxiv.org/abs/2212.10400.

16. **Weiwei Sun**, S. Guo, S. Zhang, P. Ren, Z. Chen, M. de Rijke, and Z. Ren, "Metaphorical user simulators for evaluating task-oriented dialogue systems," *ACM Transactions on Information Systems*, vol. 42, 2023. 🔗 URL: https://arxiv.org/abs/2204.00763.

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[18] **Weiwei Sun**, C. Meng, Q. Meng, Z. Ren, P. Ren, Z. Chen, and M. de Rijke, "Conversations powered by cross-lingual knowledge," in *SIGIR*, 2021, pp. 1442–1451. ⊘ URL: https://irlab.science.uva.nl/wp-content/papercite-data/pdf/sun-2021-conversations.pdf.

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[20] W. Liu, X. Ma, **Weiwei Sun**, Y. Zhu, Y. Li, D. Yin, and Z. Dou, "Reasonrank: Empowering passage ranking with strong reasoning ability," in *arXiv*, 2025. ⊘ URL: https://arxiv.org/abs/2508.07050.

[21] S. Li, T. Marwah, J. Shen, **Weiwei Sun**, A. Risteski, Y. Yang, and A. Talwalkar, "Codepde: Benchmarking llms' abilities to solve pdes through code generation," in *arXiv*, 2025. ⊘ URL: https://arxiv.org/abs/2505.08783.

[22] Z. Shi, L. Yan, **Weiwei Sun**, Y. Feng, P. Ren, X. Ma, S. Wang, D. Yin, M. de Rijke, and Z. Ren, "Direct retrieval-augmented optimization: Synergizing knowledge selection and language models," in *arXiv*, 2025. ⊘ URL: https://arxiv.org/abs/2505.03075.

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[25] Y. Chen, Q. Liu, Y. Zhang, **Weiwei Sun**, D. Shi, J. Mao, and D. Yin, "Tourrank: Utilizing large language models for documents ranking with a tournament-inspired strategy," in *WWW*, 2025. ⊘ URL: https://arxiv.org/abs/2406.11678.

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[27] Z. Shi, S. Zhang, **Weiwei Sun**, S. Gao, P. Ren, and Z. C. abd Zhaochun Ren, "Generate-then-ground in retrieval-augmented generation for multi-hop question answering," in *ACL*, 2024. ⊘ URL: https://arxiv.org/abs/2406.14891.

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[30] Y. Zhao, L. Yan, **Weiwei Sun**, G. Xing, S. Wang, C. Meng, Z. Cheng, Z. Ren, and D. Yin, "Improving the robustness of large language models via consistency alignment," in *LREC-Coling*, 2024. ⊘ URL: https://arxiv.org/abs/2403.14221.

[31] Y. Zhao, L. Yan, **Weiwei Sun**, G. Xing, C. Meng, S. Wang, Z. Cheng, Z. Ren, and D. Yin, "Knowing what llms do not know: A simple yet effective self-detection method," *NAACL*, 2024. ⊘ URL: https://arxiv.org/abs/2310.17918.

[32] Y. Zhao, L. Yan, **Weiwei Sun**, C. Meng, S. Wang, Z. Cheng, Z. Ren, and D. Yin, "Diqad: A benchmark dataset for end-to-end open-domain dialogue assessment," in *Findings of EMNLP*, 2023. ⊘ URL: https://aclanthology.org/2023.findings-emnlp.1010.pdf.

33 Z. Shi, **Weiwei Sun**, S. Zhang, Z. Zhang, P. Ren, and Z. Ren, "Rade: Reference-assisted dialogue evaluation for open-domain dialogue," in *ACL*, 2023, pp. 12 856–12 875. 🔗 URL: https://arxiv.org/abs/2309.08156.

34 S. Guo, S. Zhang, **Weiwei Sun**, P. Ren, Z. Chen, and Z. Ren, "Towards explainable conversational recommender systems," in *SIGIR*, 2023, pp. 2786–2795. 🔗 URL: https://arxiv.org/abs/2305.18363.

35 C. Meng, P. Ren, Z. Chen, **Weiwei Sun**, Z. Ren, Z. Tu, and M. de Rijke, "Dukenet: A dual knowledge interaction network for knowledge-grounded conversation," in *SIGIR*, 2020, pp. 1151–1160. 🔗 URL: https://ir.sdu.edu.cn/~zhaochunren/papers/meng-2020-dukenet.pdf.

Awards and Achievements

2025	🔖	**LTI Presidential Fellowship**, CMU.
2024	🔖	**Baidu Scholarship**, Global Top-10, Baidu Inc.
2023	🔖	**Outstanding Paper Award**, EMNLP 2023.
	🔖	**Presidential Scholarship**, Top 0.1%, Shandong University.
	🔖	**National Scholarship**, Top 0.2%, Shandong University.
2021	🔖	**Outstanding Graduate with Honorary Degree**, Shandong University.
2019	🔖	**National Second Price**, Mathematical Contest in Modeling (CUMCM).
2017 – 2023	🔖	**College Academic Scholarship**, Shandong University.

Selected Projects

2025	🔖	**PPP-Agent:** Agent optimized for productive, proactive, and personalized agent–user interactions. The PPP RL framework outperforms GPT-5 on vague user prompts. https://arxiv.org/abs/2511.02208 https://github.com/sunnweiwei/PPP-Agent
	🔖	**Context-Folding:** Agent that actively compresses and folds its context. RL algorithm enables end-to-end optimization with significant improv. on SWE-Bench and BrowseComp. https://arxiv.org/abs/2510.11967 https://github.com/sunnweiwei/FoldAgent
	🔖	**CoMind:** Community-driven multi-agent system for automated machine learning engineering. SOTA results on MLE-Bench and rank top 7.4% of ongoing Kaggle competitions. https://arxiv.org/abs/2506.20640 https://github.com/comind-ml/CoMind
2023	🔖	**RankGPT:** First work to use LLMs for zero-shot listwise text ranking. SOTA results on major IR benchmarks and is adopted by LangChain / LlamaIndex / etc. https://arxiv.org/abs/2304.09542 https://github.com/sunnweiwei/RankGPT

Academic Service

Reviewer	🔖	EMNLP 2022, ACL 2023, SIGIR 2023, SIGIR-AP 2023, ECML/PKDD 2023, IPM 2023, WSDM 2023, EMNLP 2023, TALLIP 2023, ACM TOIS 2024, SIGIR 2024, ECML/PKDD 2024, EMNLP 2024 (SAC), ACL ARR 2024 June SAC, CIKM 2024, NeurIPS 2024, WSDM 2025, ICLR 2025, AISTATS 2025, ICML 2025, NeurIPS 2025 (Top Reviewer), AAAI 2026, ICLR 2026.
Volunteer	🔖	YSSNLP 2022, NLPCC 2022, SIGIR-AP 2023.
Tutorial	🔖	WWW 2024, Recent Advances in Generative Information Retrieval.
Workshop	🔖	The 2025 LTI Student Research Symposium. Link.