Yilei TU

Current Address: Chengdu City, Sichuan Province, China
All the text and icons in Cadet Blue are hyperlinked.

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(+86) 18009072300
Interests: Multilingual & Multimodal LMs

Education

ETH Zurich (Swiss Federal Institute of Technology Zurich) — Zurich, ZH, Switzerland
MSc in Data Science • Dept of Computer Science • Advisors: Profs. Ryan Cotterell and Mrinmaya Sachan — *Sep 2021 –Dec 2024*

- **GPA:** 5.4/6.0 (Top 30% of Cohort) **Research Foci**: NLP, Reasoning Ability of LLMs **Award**: ETH Scholarship

The Chinese University of Hong Kong, Shenzhen — Shenzhen, GD, China & HK
BSc in Statistics (Stream: Data Science) • School of Science and Eng. • Advisor: Prof. Jianfeng Mao — *Sep 2017 –Nov 2020*

- **Cum GPA:** 3.76/4.0 (Rank 11/313) **Major GPA:** 3.85/4.0 (Rank 5/150) **Research Foci**: AI/ML Algorithm Applications

Internships

ModelBest AGI Co., Ltd. — Beijing, BJ, China
Algorithm Intern • Multimodality Group • Supervisor: Prof. Yuan Yao — *Apr 2025 –Aug 2025*

- Contributed to the development of the open-source omni-modal large language model MiniCPM-4o, enhancing its advanced speech understanding and reasoning capabilities. Designed and implemented its streaming generation architecture.
- Evaluated model performance on 10+ datasets, achieving results surpassing open-source models such as CosyVoice2 and Qwen2.5-Omni-7B. Incorporated 30+ advanced speech capability datasets into the subsequent training process.

Tencent — Shenzhen, GD, China
Algorithm Engineer • Financial Technology (FiT) • Supervisor: Liang Chen — *Jul 2021 –Sep 2021*

- Collaborated with colleagues to propose a new algo-trading based on neural models (XGBoost and LSTM) and modern portfolio theories (CAPM, Black-Litterman). Backtested the strategy and achieved a 12% outperformance over S&P 500.
- Collected and analyzed US stock indicators and designed their calculation methods or alternatives in China's stock market.

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Huawei — Shenzhen, GD, China
Software Development Engineer • Intelligent Automotive Solution (IAS) — *Jun 2020 –Aug 2020*

- Developed audit-log module by Golang to concurrently monitor and report crucial behaviors of the administrators and users.
- Completed a series of APIs' design, development, test and deployment of the IAS cloud identity management system.

Research Experience

CompLING Lab, University of Waterloo & Vector Institute — Waterloo, ON, Canada
*Visiting Scholar • Supervisor: Prof. **Freda Shi*** — *Sep 2024 –Feb 2025*

- Analyzed systematically multilingual in-context learning; Showed that demonstrations in mixed high-resource languages consistently outperform English-only ones across the board, particularly for tasks written in low-resource languages. Highlighted the potential of leveraging multilingual resources to bridge the performance gap for underrepresented languages.[1].

LRE Lab, ETH Zurich — Zurich, ZH, Switzerland
*Research Assistant • Supervisor: Prof. **Mrinmaya Sachan*** — *May 2024 –Aug 2024*

- Found that VLMs can nearly perfectly identify entities in diagrams and demonstrate strong reasoning abilities on entities, while barely identify relations, and they are unable to reason about them [2].
- Validated that VLMs rely on knowledge shortcuts answering complex relation reasoning questions, indicating that the successes of VLMs on diagram reasoning tasks give a false illusion of their diagram understanding capabilities.

Rycolab, ETH Zurich — Zurich, ZH, Switzerland
*Research Assistant • Supervisor: Prof. **Ryan Cotterell*** — *Jun 2023 –Dec 2023*

- Investigated the probing accuracy of probes across varying complexities on pretrained and randomized representations (rep), found that more complex probes perform worse, especially when linguistic information is not present in the representations [4].
- Revealed a counter-intuitive trend that increased complexity leads to lower accuracy and that the noise in randomized rep hampers learning, while for pretrained rep, high and stable probing accuracy is observed, insensible to hyperparam variations.

Chair of Applied Economics, ETH Zurich — Zurich, ZH, Switzerland
*Research Assistant • Part-time • Supervisor: Prof. **Peter Egger**, Dr. **Susie Rao*** — *Jan 2023 –Aug 2024*

- Built a chatbot combining Llama3 and SemOpenAlex knowledge graph to support meta-science research, recommending similar papers and authors and answering users' questions about scientific literatures [3, 5].

- Applied LLMs for classification and keyword extraction of literatures; Developed an open-source cross-discipline annotation and inference engine that allows users to annotate features easily and to fine-tune meta-science downstream tasks [6].

Shenzhen Research Institute of Big Data & CUHK-Shenzhen Shenzhen, GD, China
Research Assistant • Supervisor: Prof. Jianfeng Mao, Dr. Yuan Wang *Dec 2020 –May 2021*

- Developed a three-staged online decision-making framework with colleagues to optimize sector-wise air traffic flow with multi-agent reinforcement learning and combinatorial programming [7].
- Developed of a new two-stage medium-term data- driven model that combined various algorithms such as ARIMA, DBSCAN, LSTM and random forest, to predict the estimated time of arrival in a multi-airport system [8].

Skills

Programming Languages & Tools: Python (PyTorch, Hugging Face, vLLM), Ollama, SQL, Git, Unix, Dokcer, Tex
Natural Languages: English (Advanced/C2, TOEFL 109/120); Mandarin Chinese & Sichuanese Dialects (Native); Cantonese (Intermediate); Standard High German (A2); Japanese (N5)

Publications, Workshops & Preprints

[1] Yilei Tu, Andrew Xue, and Freda Shi. Blessing of Multilinguality: A Systematic Analysis of Multilingual In-Context Learning. In Wanxiang Che, Joyce Nabende, Ekaterina Shutova, and Mohammad Taher Pilehvar, editors, *Findings of the Association for Computational Linguistics: ACL 2025*, pages 6213–6248, Vienna, Austria, July 2025. Association for Computational Linguistics.

[2] Yifan Hou*, Buse Giledereli*, Yilei Tu*, and Mrinmaya Sachan. Do Vision-Language Models Really Understand Visual Language? In *Forty-second International Conference on Machine Learning*, 2025.

[3] Yilei Tu*, Noah Mamié*, Xi Susie Rao, and Peter Egger. Knowledge-Enhanced Academic Chatbot: Harnessing Large Language Models and Knowledge Graphs. Under revision.

[4] Yilei Tu, Jiaoda Li, and Ryan Cotterell. Complex Probes are Favored: A Revisit of Probe Complexity. Under revision.

[5] Susie Rao, Noah Mamié, Yilei Tu, and Prakhar Bhandar. AI Support Systems for Academic Research. In Capol Corsin, Cieliebak Mark, Weichselbraun Albert, Musat Claudiu, Maier Elisabeth, and Zimmermann Lucas, editors, *Proceedings of the 9th edition of the Swiss Text Analytics Conference*, pages 226–227, Chur, Switzerland, June 2024. Association for Computational Linguistics.

[6] Susie Xi Rao, Yilei Tu, and Peter H. Egger. SAINE: Scientific Annotation and Inference Engine of Scientific Research. In *IJCNLP-AACL 2023: System Demonstrations*, pages 41–58, Bali, Indonesia, November 2023. Association for Computational Linguistics.

[7] Yuan Wang, Weilin Cai, Yilei Tu, and Jianfeng Mao. Reinforcement-Learning-Informed Prescriptive Analytics for Air Traffic Flow Management. *IEEE Transactions on Automation Science and Engineering*, pages 1–15, 2023.

[8] Lechen Wang, Jianfeng Mao, Lishuai Li, Xuechun Li, and Yilei Tu. Prediction of estimated time of arrival for multi-airport systems via "Bubble" mechanism. *Transportation Research Part C: Emerging Technologies*, 149:104065, 2023.

External Links

All the text and icons in Cadet Blue are hyperlinked. Some URLs are provided explicitly below.

- Personal Website: https://yileitu.github.io/
- Google Scholar: https://scholar.google.com/citations?user=jPeyGn4AAAAJ&hl=en
- GitHub: https://github.com/yileitu
- LinkedIn: https://www.linkedin.com/in/yileitu/
- Paper [1]: https://aclanthology.org/2025.findings-acl.323/
- Paper [2]: https://openreview.net/forum?id=ZPQU4uGMBA&noteId=KTyLtnIjk9
- Paper [3]: https://yileitu.github.io/assets/pdf/Chatbot.pdf
- Paper [4]: https://yileitu.github.io/assets/pdf/EACL_submission.pdf
- Paper [5]: https://aclanthology.org/2024.swisstext-1.50/
- Paper [6]: https://aclanthology.org/2023.ijcnlp-demo.6
- Paper [7]: https://ieeexplore.ieee.org/abstract/document/10258410
- Paper [8]: https://www.sciencedirect.com/science/article/pii/S0968090X23000542