Haotian Sun

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Research Interests: Adaptive Computation for Foundation Models;
Black-box Adaptation and Personalization; Agentic Planning

Education

Georgia Institute of Technology | *GPA – 4.0/4.0* — Fall 2022 - Present
Ph.D. Student in Machine Learning — *Atlanta, GA*

École CentraleSupélec | *GPA – 3.9/4.0* — Fall 2015 – Summer 2017
Dual Degree Program in collaboration with Xi'an Jiaotong University — *Paris, France*

Xi'an Jiaotong University | *Average Grade – 91/100* — Fall 2013 – Summer 2020
Honors Youth Program — *Xi'an, China*
Highly selective nationwide program accepting under 120 students each year

Experience

Apple | *AI/ML Intern, Foundation Model Team* — May 2024 - August 2024
Manager: Nan Du — *Cupertino, CA*
Research Focus: Scaling up multi-modal generative models with adaptive computation

Georgia Institute of Technology | *Graduate Research Assistant* — August 2022 - Present
Advisors: Bo Dai, Chao Zhang — *Atlanta, GA*
Research Focus: Adaptation and personalization for black-box LLMs; Agentic planning with LLMs.

Featured Projects

HYDRA: Model Factorization Framework for Black-Box LLM Personalization — Spring 2024
- Developed a model factorization framework that personalizes black-box LLMs by capturing user-specific patterns and shared knowledge without relying on access to the model's inherent parameters;
- Designed a reranker and adapter that prioritize relevant historical records and align with user preferences;
- Delivered 9.01% average improvement over SoTA prompt-based methods across diverse personalization tasks.

BBox-Adapter: Lightweight Adapting for Black-Box Large Language Models — Fall 2023
- Proposed an effective domain adaptation approach that is transparent, privacy-conscious, and cost-effective for customizing commercial black-box LLMs with only APIs;
- Designed an online adaptation framework iteratively sampling from previous inferences and optimizing the backend lightweight adapter (up to 0.3B);
- Achieved up to 6.77% improvement over the base model with 31.30x less training cost and 1.84x less inference cost than the official SFT service.

AdaPlanner: Adaptive Planning from Feedback with Language Models — Spring 2023
- Proposed AdaPlanner, a closed-loop planning approach allowing the LLM agent to refine its self-generated plan adaptively in response to environmental feedback;
- Developed a code-style LLM prompt structure that facilitates plan generation across a variety of tasks;
- Designed a skill discovery mechanism that leverages successful plans as few-shot exemplars, boosting sample efficiency by up to 600x.

ToolQA: A Dataset for LLM Question Answering with External Tools — Spring 2023
- Proposed a new dataset to faithfully evaluate LLMs' ability to use external tools for question answering;
- Minimized the overlap between our benchmark data and LLMs' pre-training data, enabling a more precise evaluation of LLMs' tool-use reasoning abilities;
- Conducted an in-depth diagnosis of existing tool-use LLMs to highlight their strengths, weaknesses, and potential improvements.

Autoregressive Diffusion Model for Graph Generation — Fall 2022
- Designed a diffusion network that learns an optimal node absorbing ordering from graph topology and a denoising network that uses the reverse node order to reconstruct the graph efficiently;
- Achieved better generation performance than previous SoTA and guaranteed fast generation speed.

Publications

[1] **Haotian Sun**[*], Yuchen Zhuang[*], Wei Wei, Chao Zhang, Bo Dai. BBox-Adapter: Lightweight Adapting for Black-Box Large Language Models, *Forty-first International Conference on Machine Learning (ICML 2024)*, **(Spotlight, top 3.5%)**.

[2] **Haotian Sun**[*], Yuchen Zhuang[*], Lingkai Kong, Bo Dai, Chao Zhang. AdaPlanner: Adaptive Planning from Feedback with Language Models, *Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS 2023)*.

[3] Yuchen Zhuang, **Haotian Sun**, Yue Yu, Rushi Qiang, Qifan Wang, Chao Zhang, Bo Dai. HYDRA: Model Factorization Framework for Black-Box LLM Personalization, *ArXiv abs/2406.02888 (2024)*.

[4] Yuchen Zhuang, Yue Yu, Kuan Wang, **Haotian Sun**, Chao Zhang. ToolQA: A Dataset for LLM Question Answering with External Tools, *Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS 2023)*.

[5] Lingkai Kong[*], **Haotian Sun**[*], Yuchen Zhuang, Haorui Wang, Wenhao Mu, Chao Zhang. Two Birds with One Stone: Enhancing Calibration and Interpretability with Graph Functional Neural Process, *Proceedings of The 27th International Conference on Artificial Intelligence and Statistics (AISTATS 2024)*.

[6] Tongzheng Ren, **Haotian Sun**, Antoine Moulin, Arthur Gretton, Bo Dai. Spectral Representation for Causal Estimation with Hidden Confounders, *ArXiv abs/2407.10448 (2024)*.

[7] Lingkai Kong, Jiaming Cui, **Haotian Sun**, Yuchen Zhuang, B Aditya Prakash, Chao Zhang. Autoregressive Diffusion Model for Graph Generation, *Fortieth International Conference on Machine Learning (ICML 2023)*.