

Hao Zhao (for pronunciation: /how-jow/) [in](#) [Linkedin](#) [g](#) [Google Scholar](#)

My main research interests include:

- Understanding and Improving LLM Alignment
- Robustness and Generalization of AI Models

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EDUCATION

- **École Polytechnique Fédérale de Lausanne** Lausanne, Switzerland
Incoming CS PhD with EDIC Fellowship
- **École Polytechnique Fédérale de Lausanne** Lausanne, Switzerland
MSc in Automatic Systems (Nomination for Outstanding Master's Thesis). GPA: 5.40/6.00 Sept. 2021 – Feb. 2024
- **Zhejiang University** Hangzhou, China
BSc in Mechanical Engineering (with honors). GPA: 3.80/4.00 Sept. 2017 – July. 2021

PUBLICATION

(* stands for equal contribution.)

- [Haonan Zou*](#), [Jie Feng*](#), [Hao Zhao](#), [Yuanyuan Shi](#), "Analytical Lyapunov Function Discovery: An RL-based Generative Approach". *Under review at the 42th International Conference on Machine Learning (ICML 2025)*.
- [Hao Zhao](#), [Maksym Andriushchenko](#), [Francesco Croce](#), [Nicolas Flammarion](#), "Is In-Context Learning Sufficient for Instruction Following in LLMs?". In *Proceedings of the 13th International Conference on Learning Representations (ICLR 2025)*. A short version was abridged in NeurIPS 2024 Workshop on Adaptive Foundation Models. Featured by [MIT Technology Review \(China\)](#).
- [Hao Zhao](#), [Maksym Andriushchenko](#), [Francesco Croce](#), [Nicolas Flammarion](#), "Long Is More for Alignment: A Simple but Tough-to-Beat Baseline for Instruction Fine-Tuning". In *Proceedings of the 41th International Conference on Machine Learning (ICML 2024)*. A short version was abridged in ICLR 2024 Workshop on Data-centric Machine Learning Research. [\[Paper\]](#) [\[Code\]](#)
- Haobo Song*, [Hao Zhao*](#), Soumajit Majumder, [Tao Lin](#), "Increasing Model Capacity for Free: A Simple Strategy for Parameter Efficient Fine-tuning". In *Proceedings of the 12th International Conference on Learning Representations (ICLR 2024)*. [\[Paper\]](#) [\[Code\]](#)
- [Hao Zhao*](#), [Yuejiang Liu*](#), [Alexandre Alahi](#), [Tao Lin](#), "On Pitfalls of Test-time Adaptation". In *Proceedings of the 40th International Conference on Machine Learning (ICML 2023)*. A short version was abridged in ICLR 2023 Workshop on Domain Generalization (**Spotlight**). [\[Paper\]](#) [\[Code\]](#)
- [Hao Zhao](#), Weifei Hu, Zhenyu Liu, Jianrong Tan, "A CapsNet-Based Fault Diagnosis Method for a Digital Twin of a Wind Turbine Gearbox". In *Proceedings of the ASME 2021 Power Conference*. Vol. 85109, p. V001T09A016. **Oral Presentation**. (**Best Paper Award** in Renewable Energy Systems track) [\[Paper\]](#)

RESEARCH EXPERIENCE

- **Aligning Base LLMs Using Many-shot In-Context Learning** Advisor: [Prof. Nicolas Flammarion](#)
Research Assistant, Theory of Machine Learning Lab, EPFL April. 2024 - Present
 - **Uncover factors behind the empirical success of many-shot ICL:** We discover the crucial role of decoding parameters and find that many-shot ICL can indeed be improved by adding high-quality data in context.
 - **Fair comparisons between many-shot ICL and IFT:** We rigorously compare the performance of many-shot ICL to that of instruction fine-tuning (IFT) and give evidence showing that many-shot ICL underperforms IFT on the established benchmark MT-Bench, especially with more capable base LLMs, but ICL could be a viable alternative to IFT in the low data regime.
 - **Outcome:** A first-author paper was accepted to ICLR 2025, and a short version paper was abridged in NeurIPS 2024 Workshop on Adaptive Foundation Models. This project was featured by [MIT Technology Review \(China\)](#).

- Efficient Data Selection for Instruction Fine-tuning LLMs**

Advisor: [Prof. Nicolas Flammarion](#)

Master Thesis Student, Theory of Machine Learning Lab, EPFL
Oct. 2023 - Feb. 2024

 - Response length is a surprisingly good metric for efficient data selection:** We found that using reply length as a heuristic can effectively select a few examples from large-scale IFT datasets such as Alpaca-52k, on which the fine-tuned LLM outperforms fine-tuning on full datasets.
 - A lightweight LLM-based refining step further improves the abilities of fine-tuned LLMs:** We propose a new instruction refinement method that prompts a powerful LLM to rewrite demonstrations via introspection.
 - Outcome:** A first-author paper was accepted to ICML 2024, and a short version paper was abridged in ICLR 2024 Workshop on Data-centric Machine Learning Research.
- Parameter-Efficient Fine-tuning**

Advisor: [Prof. Tao Lin](#)

Research Assistant (remote), Learning and Inference Systems Lab, Westlake University
Mar. 2023 - Sep. 2023

 - Boost model capacity without additional costs:** We propose CapaBoost, a simple strategy that effectively increases the rank of injected weight matrices without adding new parameters, thereby enhancing the model capacity for free, by leveraging low-rank updates through interconnected parallel weight modules in target layers.
 - Outcome:** A co-first author paper was accepted to ICLR 2024.
- On Pitfalls of Test-Time Adaptation**

Advisor: [Prof. Alexandre Alahi](#)

Semester Project Student, Visual Intelligence for Transportation Lab, EPFL
Mar. 2022 - Febr. 2023

 - The first TTA Benchmark:** We build the first ever comprehensive TTA benchmark, TTAB, which encompasses over 10 state-of-the-art algorithms, a diverse array of distribution shifts, and two evaluation protocols.
 - Towards understanding the empirical success of TTA:** We identify 3 primary pitfalls in prior efforts, including hyperparameter sensitiveness, disparities among different base models trained using various strategies, and vulnerability to certain distribution shifts.
 - Outcome:** A co-first author paper was accepted to ICML 2023, and a short version paper was abridged in ICLR 2023 Workshop on Domain Generalization (**Spotlight**).

INDUSTRY INTERNSHIP

- Neural Radiance Fields for Thermal Novel View Synthesis**

Advisor: [Dr. Malcolm Mielle](#)

Machine Learning Engineer Intern, Schindler Elevator AG, Switzerland
Mar. 2023 - Aug. 2023

 - Multimodal scene reconstruction:** I developed a novel multimodal approach based on Neural Radiance Fields, capable of rendering new RGB and thermal views of a scene jointly, and helped release a new RGB+thermal dataset for scene reconstruction.

HONORS AND AWARDS

- One-year EDIC PhD Fellowship (CHF 55'150) 2025
- Nomination for EPFL Outstanding Master's Thesis 2024
- Best Paper Award at ASME 2021 Power Conference 2021
- Outstanding Graduate of Zhejiang University (top 20%) 2021
- Excellent Design Award for Undergraduate Thesis (top 10%) 2021
- Academic Scholarship of Zhejiang University (top 10%. Institutional. Academic. \$1000 each) 2018-2020

MISCELLANEA

- Volunteer** for [ICLR 2025](#)
- Reviewer for conference:** [ICLR 2025](#), [NeurIPS 2025](#)
- Media coverage.** [MIT Technology Review \(China\)](#)
- English proficiency.** TOEFL iBT: 108 (R30/W30/L25/S23); GRE: 325 (Q170/V155)
- Other interests.** I enjoy strength training, swimming, and hiking.