

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

My main research interests include:

- Alignment and robustness of LLMs
- Design efficient and robust learning methods in imperfect environments

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EDUCATION

- **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.)

- [Hao Zhao](#), [Maksym Andriushchenko](#), [Francesco Croce](#), [Nicolas Flammarion](#), "Is In-Context Learning Sufficient for Instruction Following in LLMs?". *Under review*, abridged in NeurIPS 2024 Workshop on Adaptive Foundation Models, featured by [MIT Technology Review \(China\)](#). [\[Paper\]](#) [\[Code\]](#)
- [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)*, 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)*, 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. (**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 is under review, and a short version paper was accepted to 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 show that selecting the 1K instructions with the longest responses from full datasets, intuitively containing more information and harder to overfit, consistently outperforms prior efforts, while remaining competitive on the factual knowledge benchmark.
 - **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 incurring additional costs:** We propose CapaBoost, a simple strategy that effectively increases the rank of incremental weights without adding 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**).

Wind Turbine Gearbox Fault Diagnosis

Advisor: [Prof. Weifei Hu](#)

Research Assistant, Institute of Design Engineering, Zhejiang University

Sept. 2020 and Mar. 2021

- **Build a new fault diagnosis pipeline:** We proposed a novel method, based on signal analysis in the frequency domain, that enables to label training data without human supervision, followed by training a neural network classifier, achieving better fault recognition accuracy and earlier warning time than prior works.
- **Outcome:** A first-author paper was accepted to the ASME 2021 Power Conference, which received a **Best Paper Award** in Renewable Energy Systems track.

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

- Nomination for EPFL Outstanding Master's Thesis 2024
- Outstanding Graduate of Zhejiang University (top 20%) 2021
- Excellent Design Award for Undergraduate Thesis (15/168) 2021
- Academic Scholarship of Zhejiang University (top 10%) 2018 & 2019 & 2020

MISCELLANEA

- **Reviewer for conference:** [ICLR 2025](#)
- **Reviewer for workshop:** [FITML@NeurIPS'24](#), [ICL@ICML'24](#), [WANT@ICML'24](#), [DMLR@ICLR'24](#)
- **Media covering:** my first-author paper, [Is In-Context Learning Sufficient for Instruction Following in LLMs?](#), is featured by [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.