Xinhe Shi

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Education

Zhejiang University **Sep. 2021 – Present**

Bachelor of Computer Science and Technology *Hangzhou, China*

- GPA: 3.97/4.0 (91.30/100)
- Main Courses: Computer Networks(98), Technology of Multimedia(98), Operating System(95), Numeric Analysis(100), Fundamentals of Data Structure(99), Digital Logic Design(97), Discrete Mathematics and Application(95), etc.

Research Interest

Large language models, Multilingual NLP, Multi-Modality

Manuscripts

[1] **Xinhe Shi**, Linchao Zhu. How to Improve LLMs' Performance on Specific Languages: A Perspective on LLM-Based Language Similarity. (Targeted at ACL 2026)

TL;DR: We systematically investigate LLM-based language similarity through both the lenses of language-specific performance patterns and cross-lingual transferability, and we verify the effectiveness LLM-based similarity measures on guiding fine-tuning language selection to improve LLMs' performance on target languages.

[2] **Xinhe Shi**, Qingcheng Zeng, Weihao Xuan, Kaize Ding. Scaling Effects on Multilingual Performance. (Targeted at ACL 2026)

TL;DR: We find that there is no significant and stable difference in performance degradation rates between high-resource and low-resource languages as model size decreases, indicating that compact models can preserve relative multilingual competence, thereby supporting their viability for globally inclusive deployment and motivating linguistically fair compression strategies.

Research Experience

REAL Lab, Northwestern University **Aug. 2025 – Present**

Research intern, supervised by Prof. Kaize Ding

- **Analysis of Scaling Effects on Multilingual Performance**
  - Investigated how reducing model size affects multilingual performance, focusing on whether analyzing **whether model performance on low-resource languages degrade faster than that on high-resource ones** as model capacity shrinks
  - Conducted comprehensive evaluations spanning four diverse model families (Qwen, Aya, Mistral, Phi) across multiple model sizes, ensuring robust and generalizable findings
  - Found that despite overall performance decline with smaller models, **there is no significant and stable disparity in performance degradation rates between high-resource and low-resource languages**, challenging assumptions about inherent disadvantages for low-resource languages in smaller models
  - Demonstrated that compact models can preserve relative multilingual competence, highlighting their viability for globally inclusive deployment and motivating linguistically fair compression strategies
- **M4CQ Dataset Construction & Multilingual Evaluation**
  - Constructed a Massive Multilingual Multitask Multiple Choice Question (**M4CQ**) dataset featuring content consistency across **19** languages and domain-balanced distribution of **135** tasks
  - Established the first comprehensive and hierarchical task categorization paradigm through systematic survey of twenty existing diverse datasets, providing a unified framework for task categorization
  - Conducted comprehensive evaluations of multiple LLMs on M4CQ to analyze their multilingual capability

Institute of Artificial Intelligence, Zhejiang University **Nov. 2023 – Aug. 2025**

Research intern, supervised by Prof. Linchao Zhu

- **Language Similarity Analysis from the Perspective of LLMs**
  - Proposed and formalized the novel research problem of **LLM-based language similarity**, challenging traditional linguistic classification paradigms and defining language similarity from the perspective of LLMs
  - Designed **dual-methodological framework** combining visualization techniques and quantitative metrics to analyze language similarity through the lens of both LLM task performance pattern and cross-lingual knowledge transfer efficiency
  - Discovered LLM-derived language similarity patterns which show partial alignment with traditional linguistic typology (e.g., Slavic language clustering) alongside novel LLM-specific patterns
- **Enhancing LLM Performance via LLM-Based Language Similarity**
  - Investigated how LLM-derived language similarity can guide fine-tuning strategies to improve model performance on specific target languages
  - Demonstrated that **selecting fine-tuning languages similar to the target language from the LLM perspective** yields better performance than selecting languages based on traditional conclusion on language families
  - Showed that LLM-based similarity–guided fine-tuning sometimes even **outperforms direct fine-tuning on the target language** itself, revealing a super-additive transfer effect
  - Provided actionable insights on fine-tuning languages selection strategies especially when target languages are low-resource languages, offering a new paradigm for language-specific performance enhancement
- **M4CQ-Pro Dataset Construction & Multilingual Evaluation**
  - Constructed a massive multilingual multitask multiple choice question dataset **M4CQ-Pro**, which features content consistency across **31** languages and domain-balanced distribution of 135 tasks
  - Conducted comprehensive evaluations of multiple LLMs on M4CQ-Pro to analyze their multilingual capability

  (The dataset will be released after subsequent work has been done)

Honors & Scholarships

- **Outstanding Graduate of Zhejiang University**
- **Zhejiang Provincial Scholarship**
- **Zhejiang University Scholarship - First Prize** (Top 3% in Zhejiang University)
- Outstanding Student of Zhejiang University
- CKC Honors College Top Students Scholarship - First Prize
- Academic Excellence Award of Zhejiang University

Extracurriculars

- **Zhejiang University Five-Star Volunteer** (Highest Volunteer Title in Zhejiang University)
  Completed over 300 volunteer hours in hospital, community, and campus outreach programs
- **Varsity Kayaking Athlete**
  Competed in 4 national-level kayaking tournaments as a core member for Zhejiang University
- **21st National Extreme Sports Competition**
  4th place in Non-Motorized Canoe
- **6th National Collegiate Canoe Championships**
  3rd place in Women's Kayak 500m Final(B)
- **The "End of the River" China Grand Canal World Heritage Dragon Boat Competition** (National Competition)
  7th place
- Sanhao Cup Table Tennis (University Championships)
  3rd place in Women's Doubles