Jianpeng Zhou

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Objective

A joint Ph.D. training program as a visiting student for one year funded by China Scholarship Council (CSC)

Education

Sun Yat-sen University, GuangZhou, China Sep. 2022 – Jun. 2026 (expected)
Advisor: Prof. Jiahai Wang *Ph.D in Computer Science and Technology*

Central China Normal University, Wuhan, China Sep. 2019 – Jun. 2022
Advisor: Prof. Jianwen Sun, Outstanding Graduate *MA.Eng. in Computer Science and Technology*

Tianjin University, Tianjin, China Sep. 2014 – Jun. 2018
B.Eng. in Mechanical Engineering

Research Interest

Reasoning with LLMs (especially in Mathematical Reasoning), Tool/Memory Augmented LLMs, LLM-based Agents (LLMs = Large Language Models)

Research Experience

LLMs' Cumulative Learning without Requiring Parametric Updates Oct. 2023 – Present

- Background: The knowledge or experience of LLMs is implicitly stored in the model parameters. Whenever we want to update the knowledge or experience, we need to change the huge amount of parameters, which consumes a lot of labors, money and time.
- We are devising methods that allow LLMs to generate experience in the form of abstract text or code snippet by analyzing data, achieved through prompt engineering. The generated experience is saved into long-term memory and then retrieved and re-used when solving problems in the future.

Dynamic Strategy Selection in LLM Reasoning May. 2023 – Oct. 2023

- Background: Prior works utilize consistent LLM models, prompting methods and degrees of problem decomposition, regardless of the problem complexity. Inflexibility of these methods can bring unnecessary computational overhead or sub-optimal performance.
- We proposed an Adaptive-Solver (AS) framework that strategically adapts solving approaches to suit various problems. Experimental results show that our methods can save more than 50% API cost or improve accuracy of mathematical reasoning by 3.5% on average.

Knowledge Tracing Algorithm and its Interpretability Sep. 2020 – Jun. 2022

- Background: Knowledge tracing is a task of educational data mining, aiming to predict student's performance on solving problems according to their past exercise data. Prior works are facing two challenges: 1) inadequate in utilizing problem information; 2) lack of interpretability for the prediction.
- For the first challenge, we constructed problem-contained graph data and designed graph embedding algorithm to learn information-enriched problem embedding. Our method can improve the predictive performance of knowledge tracing algorithm significantly.
- For the second challenge, we designed a hierarchical attention network to build knowledge tracing model and utilized the attention weights to give reasonable explanation about how model make a prediction.

Publication

- **Jianpeng Zhou**, Wanjun Zhong, Yanlin Wang, Jiahai Wang. Adaptive-Solver Framework for Dynamic Strategy Selection in Large Language Model Reasoning. Submitted to *NAACL*. [PDF]
- Jianwen Sun (supervisor), Shangheng Du, Xin Yuan, **Jianpeng Zhou***, et al. Question Embedding on Weighted Heterogeneous Information Network for Knowledge Tracing[J]. Under review at *ACM Transactions on Knowledge Discovery from Data*.
- Jianwen Sun (supervisor), **Jianpeng Zhou**, Sannüya Liu, Feijuan He, Yun Tang. Hierarchical Attention Network Based Interpretable Knowledge Tracing[J]. *Journal of Computer Research and Development* (in Chinese), 2021, 58(12): 2630-2644. [PDF]

- Jianwen Sun (supervisor), **Jianpeng Zhou**, Kai Zhang, Qing Li, Zijian Lu. Collaborative Embedding for Knowledge Tracing[C]//In *International Conference on Knowledge Science, Engineering and Management*, 2021: 333-342. [PDF]

Authorized Patent

- Sun Jianwen, Liu Sannvya, **Zhou Jianpeng**, Zhang Kai. A knowledge tracing method and system based on collaborative embedding-enhanced question representation[P].:CN112949929A,2021-06-11.

Skills

English: TOEFL(95/120), CET-6 (562, Top 20%)
Languages: Python > C/C++
Framework: PyTorch > Tensorflow, Huggingface

Service

Teaching Assistant: "Advanced Artificial Intelligence" at Sun Yat-sen University in Fall 2022