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Research Interesting

I'm currently exploring the intersection of AI for knowledge reassembling. I'm particularly interested in connecting with others who share my passion for the following concepts:

- **Comprehensive Scientific Analysis via Autonomous AI Systems**: Integrating the entirety of scientific knowledge throughout human history into AI systems. This approach aims to rethink, reinterpret, and reconstruct our understanding of natural sciences.
- **Thinking While Investigating (TWI) Systems**: Developing AI that functions as a real-time cognitive assistant, searcher, and analyzer during various activities such as writing, speaking, and observing.
- **Large-Scale Multi-Agent Interaction Simulations**: Creating complex, AI-driven scenarios that model interactions between multiple intelligent agents, potentially offering new insights into complex systems and behaviors.

Education

- **Singapore University of Technology and Design** Singapore
  ***Ph.D**. in Science, Math, and Technology* *Jan. 2018 - July 2022*
- **Chu Kochen Honors College, Zhejiang University** Hangzhou
  ***B.S**. in Physics (Honour)* *Supt. 2013 - July 2017*

Working

- **Chinese University of Hong Kong** Hong Kong
  Postdoctoral Fellow *Sept 2023 - Present*
- **Shanghai AI Lab** Shanghai
  Researcher (AI for Science, LLM) *July 2022 - Present*

Highlight Projects

- **Scientific Knowledge LLM** : Leveraging the logical reasoning capabilities of Large Language Models to analyze and construct a comprehensive scientific knowledge graph spanning from ancient times to the present. This project involves real-time tracking and archiving of cutting-edge scientific and technological developments, identifying and extrapolating frontier knowledge. The ultimate goal is to enhance the transmission of human knowledge and significantly improve productivity in scientific research.
  - : Developed the Uparxive dataset for scientific knowledge representation.
  - : Created the Lougat scientific OCR model for efficient text extraction from scientific documents.
  - : Implemented the DocReLM self-instructing embedding system for document understanding.
  - : Engineered PDF Kit: A tool optimized for batch processing of scientific literature. 10x optimized for 80M pdfs
  - : Designed a Knowledge-Based Writing Fill-in Completion system to assist writing.
- **Large Quake Model: FisH** : The "FisH" model provides a unified solution to three critical problems in earthquake wave processing: picking, location estimation, and intensity estimation. Utilizing a Linear Transformer-based RetNet model, FisH achieves sub-second response latency, significantly expanding the window for earthquake early warning systems. This approach dramatically reduces computational costs while maintaining high accuracy.
- **Large Weather Model: Fengwu** : The "Fengwu" large-scale model, built on multimodal and multi-task deep learning methods, represents a breakthrough in meteorological forecasting. It achieves, for the first time, effective forecasts of core atmospheric variables at high resolution for over 10 days, outperforming existing models in 80% of evaluation metrics. Fengwu can generate high-precision global forecasts for the next 10 days in just 30 seconds, marking a significant leap in both accuracy and efficiency compared to traditional weather models.

Acadamic

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- Wei G, Pang X, **Zhang T**, et al. DocReLM: Mastering Document Retrieval with Language Model[J]. arXiv preprint arXiv:2405.11461, 2024.
- C. Kang, T. Han, J. Gong, **T. Zhang**, Lei Bai, Wanli Ouyang et al. "*FengWu: Pushing the Skillful Global Medium-range Weather Forecast beyond 10 Days Lead.*" arXiv preprint arXiv:2304.02948 (2023).
- **T. Zhang**, L. K. Ang , "*Deep learning-based design of broadband GHz complex and random metasurfaces*", APL Photonics 6, 106101 (2021)