Tianyang Liu

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🖥 Personal Profile   ⦿ GitHub   in LinkedIn   G+ Google Scholar   🐦/ 𝕏 Twitter/𝕏

📚 Education

University of California, San Diego	**San Diego, CA, USA**
Computer Science M.Sc. 4.00 GPA	2022–Present
Mentors: Zhiting Hu, Julian McAuley	
Wuhan University	**Wuhan, Hubei, China**
Software Engineering B.Eng. 3.85 GPA	2018–2022
Mentors: Peng Liang, Chong Wang	

🔍 Research Interests

My primary research interests pivot around **Artificial Intelligence (AI)**, **Machine Learning (ML)**, and **Natural Language Processing (NLP)**. A keen focal point of my endeavors lies in the capabilities and potential of **Large Language Models (LLMs)**. My primary research areas include:

💡 **Commonsense/Symbolic Reasoning in LLMs:** Investigating methods to improve the commonsense knowledge and symbolic reasoning abilities of LLMs to enhance their decision-making capabilities.

🔧 **Autonomous Tool Usage by LLMs:** Innovating mechanisms allowing LLMs to autonomously use tools, thereby broadening their problem-solving capabilities.

🤖 **LLMs as Intelligent Agents:** Harnessing the potential of LLMs to act as intelligent agents, facilitating user interaction and providing assistance across a plethora of domains.

📋 **Evaluation of LLMs:** Rigorously assessing the capabilities, limitations, and practical applications of LLMs to ensure their efficacy and reliability in real-world scenarios.

📰 Publications (* equal contribution)

⚙ **RepoBench: Benchmarking Repository-Level Code Auto-Completion Systems**
Tianyang Liu, Canwen Xu, Julian McAuley
Preprint, 2023
[arXiv] [code]

⚙ **ToolkenGPT: Augmenting Frozen Language Models with Massive Tools via Tool Embeddings**
Shibo Hao, *Tianyang Liu*, Zhen Wang, Zhiting Hu
NeurIPS, 2023 (Oral)
[arXiv] [code]

– **Architecture Decisions in AI-based Systems Development: An Empirical Study**
Beiqi Zhang, *Tianyang Liu*, Peng Liang, Chong Wang, Mojtaba Shahin, Jiaxin Yu
SANER, 2023
[arXiv]

– **RoseMatcher: Identifying the Impact of User Reviews on App Updates**
Tianyang Liu, Chong Wang, Kun Huang, Peng Liang, Beiqi Zhang, Maya Daneva, Marten van Sinderen
IST, 2023
[paper]

– **The Role of User Reviews in App Updates: A Preliminary Investigation on App Release Notes**
Chong Wang*, *Tianyang Liu**, Peng Liang, Maya Daneva, Marten van Sinderen
APSEC, 2022
[paper]

Note: ⚙ indicates selected key publications.

👨‍💻 Research Experience

LLM Reasoners🧉　　　　　　　　　　　　　　　　　　　　　　　　　June 2023–Present

Advisor: Prof. Zhiting Hu (UC San Diego)

- Developed a library (GitHub, ∼500 stars) for advanced Large Language Model reasoning, incorporating state-of-the-art reasoning algorithms like RAP-MCTS and Tree-of-Thoughts, balancing exploration and exploitation with the idea of "World Model" and "Reward".
- Provided intuitive visualization tools that allow users to easily comprehend complex reasoning algorithms with a single line of Python code.
- Integrated compatibility with multiple LLM frameworks, including 🤗Huggingface, OpenAI API, LLaMA (fairscale backend), LLaMA.cpp, etc.
- Publication coming soon.

LLM Meets Tabular Data　　　　　　　　　　　　　　　　　　　　　May 2023–Present

Advisor: Prof. Muhao Chen (University of Southern California)

- Explored challenges in integrating tabular data comprehension with Large Language Models (LLMs), addressing the inherent disparities between structured tables and unstructured text.
- Formulated guidelines to enable LLMs to effectively utilize tabular data for informed decision-making.
- Proposed strategies for unifying structured tabular data within LLM processing paradigms.
- Balanced semantic reasoning (CoT reasoning) and symbolic reasoning (Agents) to enhance LLM decision-making.
- Publication coming soon.

Repository-Level Code Completion　　　　　　　　　　　　　　　　Mar. 2023–Present

Advisor: Prof. Julian McAuley (UC San Diego)

- Proposed and developed REPOBENCH, a benchmark featuring three interconnected evaluation tasks: retrieval, completion, and end-to-end tasks, for evaluating the efficacy of repository-level code auto-completion systems.
- Performed exhaustive experiments on multiple state-of-the-art code auto-completion models to assess their performance.
- Currently collaborates with the ⭐ StarCoder project of the BigCode Team.
- Publication: *RepoBench: Benchmarking Repository-Level Code Auto-Completion Systems*.

Language Model Argumentation with Functions/Tools　　　　　　　Mar. 2023–Present

Advisor: Prof. Zhiting Hu (UC San Diego)

- Investigated the augmentation of large language models with external tools to tackle complex problems across various domains.
- Introduced TOOLKENGPT, an innovative methodology for learning function embeddings that can be seamlessly integrated into language models.
- Publication: *ToolkenGPT: Augmenting Frozen Language Models with Massive Tools via Tool Embeddings*.

Crowdsourced Software Requirement Engineering　　　　　　　　Sep. 2021–Nov. 2022

Advisors: Prof. Peng Liang, Prof. Chong Wang (Wuhan University)

- Explore the influence of user reviews on app updates by analyzing the correlation between user reviews and app release notes in the App Store.
- 3 publications on Software Requirement Engineering.

🤝 Professional Services

Invited Reviewer: NLPCC

🖐 Techinical Skills

🚀 **Programming Languages**: Python, JavaScript, HTML, SQL, LaTeX, Git, VSCode
🔴 **Machine Learning & Deep Learning Libraries**: Pytorch, 🤗 Huggingface Transformers, DeepSpeed
🌐 **Languages**: Chinese (native), English (fluent)