

Hao ZHANG

COMPUTER SCIENCE · STAFF ALGORITHM ENGINEER · PH.D · SG PERMANENT RESIDENT

Language and Science AI Lab (LASA), DAMO Academy, Alibaba Group. #03-01, Lazada One, 51 Bras Basah Rd, 189554, Singapore

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Summary

ZHANG Hao is a senior research scientist at the Language and Science AI Lab (LASA), Alibaba DAMO Academy, working on multimodal large language models (LLMs) and their applications in the medical field. His research focuses on developing novel techniques, including RAG, Agents, Complex Reasoning, and Data Synthesis, to enhance the capabilities of multimodal LLMs and apply them to address real-world challenges. Prior joining DAMO Academy, He served as a principal engineer at Huawei Noah's Ark Lab for two years. He received Ph.D degree at the College of Computing and Data Science at Nanyang Technological University (NTU), Singapore in July 2022, under the supervision of Professor Aixin SUN.

Education

Nanyang Technological University (NTU)

50 Nanyang Avenue, SG 639798

PH.D. IN COMPUTER SCIENCE

Aug 2019 - Jul 2022

School of Computer Science and Engineering (SCSE), supervisor: Prof. **Aixin SUN**

M.SC. IN COMMUNICATIONS ENGINEERING

Aug 2015 - Jul 2016

School of Electrical and Electronic Engineering (EEE)

Dalian University of Technology (DUT)

Dalian, P.R. China, 116024

B.ENG. IN COMMUNICATIONS ENGINEERING

Sep 2011 - Jul 2015

School of Information and Communication Engineering (SICE)

Experience

Singapore R&D Center, DAMO Academy, Alibaba Group

51 Bras Basah Rd, SG 189554

STAFF ALGORITHM ENGINEER @ LANGUAGE AND SCIENCE AI LAB (LASA)

Jul 2024 - Present

- **Multimodal LLMs for Medicine:** Responsible for the development of multimodal LLMs and applying them to the medical field.
- **Researches:** RAG, Agents, LLM's complex reasoning, multimodal reasoning, and data synthesis.

Singapore Research Center (2012 Laboratories), Huawei International

9 N Buona Vista Dr, SG 138588

PRINCIPAL ENGINEER @ NOAH'S ARK LAB

Jul 2022 - Aug 2024

- **Retrieval-Augmented LLM (RA-LLM):** Responsible for the design of RAG framework based on Huawei's PanGu LLM, focusing on the pre-search control, post-search process, and response generation. The model has been deployed and used in various Huawei products (like Xiaoyi Suggestion, Petal Search, and W3 Search) and third-party companies for knowledge QA of open and vertical domains.
- **LLM4Rec:** Reformulating recommendation as NLP task under the conversational recommendation scenario and developing LLM-enhanced recommendation algorithms.
- **LLM Agent:** Develop LLM agents based on PanGu LLM (from scratch) and open-sourced LLMs to execute versatile tasks by calling APIs and tools, especially focusing on searching and recommendation scenarios.
- **Researches:** adaptive RAG, LLM-based retrieval, hallucination detection, LLM's knowledge boundary, LLM planning & reasoning, etc.

Agency for Science, Technology and Research (A*STAR)

1 Fusionopolis Way, SG 138632

SENIOR RESEARCH ENGINEER & PRINCIPAL INVESTIGATOR @ CENTRE FOR FRONTIER AI RESEARCH (CFAR)

Jan 2022 - May 2022

- **Towards Efficient Spatio-Temporal Video Grounding via Self-supervision.** Explore to develop an efficient and effective spatio-temporal video grounding framework via self-supervised learning, which could be used to facilitate large-scale video surveillance, vehicle navigation, video stream editing, etc.

RESEARCH ENGINEER @ COMPUTING & INTELLIGENCE (C&I), INSTITUTE OF HIGH PERFORMANCE COMPUTING (IHPC)

Aug 2020 - Dec 2021

- **Safe & Robust AI, WP1: Poisoning & Backdoor in Model Training.** Explore data poisoning and backdoor attacks and develop effective approaches to defense against poisoning & backdoor attacks.
- **Human-Robot Collaborate AI for Advanced Manufacturing Engineering (AME), WP3: Human-like Concept and Task Learning.**

RESEARCH ENGINEER @ ARTIFICIAL INTELLIGENCE INITIATIVE (A*AI), INSTITUTE OF HIGH PERFORMANCE COMPUTING (IHPC)

Jun 2018 - Jul 2020

- **Human-Robot Collaborate AI for Advanced Manufacturing Engineering (AME), WP3: Human-like Concept and Task Learning.** Exploit planning, reinforcement learning, and implicit learning techniques for automatic robotic programming and human-robot collaboration.

Nanyang Technological University (NTU)

50 Nanyang Avenue, SG 639798

RESEARCH ASSOCIATE @ TEMASEK LABORATORIES (TL)

Jul 2016 - May 2018

- **Collaborated with Social & Cognitive Computing (SCC) Department, IHPC, A*STAR**
- **PrimeNet: Human-inspired Framework for Commonsense Knowledge Representation and Reasoning.** Set out a framework for a commonsense KB that allows for efficient commonsense reasoning and supports intelligent machine performance in real-world tasks.
- **MARACANA: Behavioural Understanding and Narrative Descriptions from Videos.** Develop technology components that can analyze and narrate real world events captured in video, and provide user with a rapid understanding of the happenings in an environment.

Selected Publications

More publications at **Google Scholar** (* indicates equal contributions)

- ◇ Huanshuo Liu*, **Hao Zhang***, Zhijiang Guo, Kuicai Dong, Xiangyang Li, Yi Quan Lee, Cong Zhang, Yong Liu. “*CtrlA: Adaptive Retrieval-Augmented Generation via Inherent Control*”. arXiv preprint arXiv:2405.18727, 2024.
- ◇ Mathieu Ravaut, **Hao Zhang**, Lu Xu, Aixin Sun, Yong Liu. “*Parameter-Efficient Conversational Recommender System as a Language Processing Task*”. The 18th Conference of the European Chapter of the Association for Computational Linguistics (EACL), 2024.
- ◇ Jing Wang, Aixin Sun, **Hao Zhang**, Xiaoli Li. “*MS-DETR: Natural Language Video Localization with Sampling Moment-Moment Interaction*”. The 61th Annual Meeting of the Association for Computational Linguistics (ACL), 2023.
- ◇ **Hao Zhang**, Aixin Sun, Wei Jing, Joey Tianyi Zhou. “*Temporal Sentence Grounding in Videos: A Survey and Future Directions*”. The IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2023.
- ◇ Sicheng Yu, Jing Jiang, **Hao Zhang**, Yulei Niu, Qianru Sun, Lidong Bing. “*Interventional Training for Out-Of-Distribution Natural Language Understanding*”. The 2022 Conference on Empirical Methods in Natural Language Processing (EMNLP), 2022.
- ◇ Sicheng Yu, Qianru Sun, **Hao Zhang**, Jing Jiang. “*Translate-Train Embracing Translationese Artifacts*”. The 60th Annual Meeting of the Association for Computational Linguistics (ACL), 2022.
- ◇ En Yen Puang, **Hao Zhang**, Hongyuan Zhu, Wei Jing. “*Hierarchical Point Cloud Encoding and Decoding with Lightweight Self-Attention based Model*”. The IEEE Robotics and Automation Letters (RA-L), 2022.
- ◇ Guoshun Nan, Rui Qiao, Yao Xiao, Jun Liu, Sicong Leng, **Hao Zhang** and Wei Lu. “*Interventional Video Grounding with Dual Contrastive Learning*”. The IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2021.
- ◇ **Hao Zhang**, Aixin Sun, Wei Jing, Liangli Zhen, Joey Tianyi Zhou and Rick Siow Mong Goh. “*Parallel Attention Network with Sequence Matching for Video Grounding*”. The Findings of the 59th Annual Meeting of the Association for Computational Linguistics (ACL), 2021.
- ◇ Sicheng Yu, **Hao Zhang**, Yulei Niu, Qianru Sun and Jing Jiang. “*COSY: COunterfactual SYntax for Cross-Lingual Understanding*”. The 59th Annual Meeting of the Association for Computational Linguistics (ACL), 2021.
- ◇ **Hao Zhang**, Aixin Sun, Wei Jing, Guoshun Nan, Liangli Zhen, Joey Tianyi Zhou and Rick Siow Mong Goh. “*Video Corpus Moment Retrieval with Contrastive Learning*”. The 44th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR), 2021.
- ◇ **Hao Zhang**, Aixin Sun, Wei Jing, Liangli Zhen, Joey Tianyi Zhou and Rick Siow Mong Goh. “*Natural Language Video Localization: A Revisit in Span-based Question Answering Framework*”. The IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2021.
- ◇ Fuzhao Xue, Aixin Sun, **Hao Zhang** and Eng Siong Chng. “*GDPNet: Refining Latent Multi-View Graph for Relation Extraction*”. The Thirty-Fifth AAAI Conference on Artificial Intelligence (AAAI), 2021.
- ◇ **Hao Zhang**, Aixin Sun, Wei Jing and Joey Tianyi Zhou. “*Span-based Localizing Network for Natural Language Video Localization*”. The 58th Annual Meeting of the Association for Computational Linguistics (ACL), 2020.
- ◇ Ming Yan, **Hao Zhang**, Di Jin and Joey Tianyi Zhou. “*Multi-source Meta Transfer for Low Resource Multiple Choice Question Answering*”. The 58th Annual Meeting of the Association for Computational Linguistics (ACL), 2020.
- ◇ Tianying Wang*, Wei Qi Toh*, **Hao Zhang***, Xiuchao Sui, Shaohua Li, Yong Liu and Wei Jing. “*RoboCoDraw: Robotic Avatar Drawing with GAN-based Style Transfer and Time-efficient Path Optimization*”. The Thirty-Forth AAAI Conference on Artificial Intelligence (AAAI), 2020.
- ◇ Joey Tianyi Zhou*, **Hao Zhang***, Di Jing and Xi Peng. “*Dual Adversarial Transfer for Sequence Labeling*”. The IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2019.
- ◇ Joey Tianyi Zhou*, **Hao Zhang***, Di Jing, Hongyuan Zhu, Rick Siow Mong Goh and Kenneth Kwok. “*Dual Adversarial Neural Transfer for Low-resource Named Entity Recognition*”. The 57th Annual Meeting of the Association for Computational Linguistics (ACL), 2019.

Theses

Towards Temporal Sentence Grounding in Videos

Supervisor: Prof. **Aixin SUN**

Doctor of Philosophy (Ph.D.), School of Computer Science and Engineering, Nanyang Technological University

Activities & Services

2019- **Reviewer/PC Member**, ACL Rolling Review, ACL, EMNLP, COLING, ICLR, AAAI, IJCAI, WWW, KDD, SIGIR, MM
2023 **Co-organizer**, Interactive Recommendation System Workshop, 16th ACM International WSDM Conference