# Zhihong Shao

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RESEARCH
INTERESTS

My interests are in natural language processing and deep learning. I am particularly interested in how we can build a robust and scalable AI system that can leverage diverse skills (e.g., tool use and reasoning) to aggregate possibly-heterogeneous information and answer natural language questions precisely regardless of their complexity. My research mainly focused on **faithful reasoning, recently in the context of utilizing large language models**. My work spans across (i) **knowledge-grounded generation** [7][3], (ii) **tool-augmented reasoning** [1][8][2][5], (iii) robust classification and text matching (e.g., paraphrase detection and natural language inference) [4].

EDUCATION

**Tsinghua University**, Beijing, China                                    September 2019 - Present
*Ph.D. Student*, Computer Science and Technology
*Advisor*: Minlie Huang

**Beihang University**, Beijing, China                                    September 2015 – July 2019
*B.E.*, Computer Science and Technology
*GPA:* 3.86/4, *Rank:* 2/213

PUBLICATIONS

[1] Synthetic Prompting: Generating Chain-of-Thought Demonstrations for Large Language Models
**Zhihong Shao**, Yeyun Gong, Yelong Shen, Minlie Huang, Nan Duan, and Weizhu Chen
*International Conference on Machine Learning (ICML), 2023.*

[2] Chaining Simultaneous Thoughts for Numerical Reasoning
**Zhihong Shao**, Fei Huang, and Minlie Huang
*Findings of Empirical Methods in Natural Language Processing (Findings of EMNLP), 2022.*

[3] Answering Open-Domain Multi-Answer Questions via a Recall-then-Verify Framework
**Zhihong Shao**, and Minlie Huang
*Annual Meeting of the Association for Computational Linguistics (ACL), 2022.*
(Best QA system on the AmbigNQ leaderboard)

[4] AdvExpander: Generating Natural Language Adversarial Examples by Expanding Text
**Zhihong Shao**, Zhongqin Wu, and Minlie Huang
*IEEE/ACM Transactions on Audio, Speech, and Language Processing (TASLP), vol. 30, pp. 1184-1196, 2022.*

[5] A Mutual Information Maximization Approach for the Spurious Solution Problem in Weakly Supervised Question Answering
**Zhihong Shao**, Lifeng Shang, Qun Liu, and Minlie Huang
*Annual Meeting of the Association for Computational Linguistics (ACL), 2021.*

[6] Long and Diverse Text Generation with Planning-based Hierarchical Variational Model
**Zhihong Shao**, Minlie Huang, Jiangtao Wen, Wenfei Xu, and Xiaoyan Zhu
*Empirical Methods in Natural Language Processing (EMNLP), 2019.*

PREPRINT

[7] Enhancing Retrieval-Augmented Large Language Models with Iterative Retrieval-Generation Synergy
**Zhihong Shao**, Yeyun Gong, Yelong Shen, Minlie Huang, Nan Duan, Weizhu Chen
*Arxiv abs/2305.15294, 2023.*

[8] CRITIC: Large Language Models Can Self-Correct with Tool-Interactive Critiquing
Zhibin Gou, **Zhihong Shao**, Yeyun Gong, Yelong Shen, Yujiu Yang, Nan Duan, Weizhu Chen
*Arxiv abs/2305.11738, 2023.*

[9] CoTK: An Open-Source Toolkit for Fast Development and Fair Evaluation of Text Generation
Fei Huang, Dazhen Wan, **Zhihong Shao**, Pei Ke, Jian Guan, Yilin Niu, Xiaoyan Zhu, and Minlie Huang
*Arxiv abs/2002.00583, 2020.*

RESEARCH
EXPERIENCE

**CoAI Lab, Tsinghua University**                    Sep 2019-Present, Beijing, China
*Ph.D. Student (Supervisor: Minlie Huang)*
Worked on open-domain multi-answer question answering [3], neuro-symbolic reasoning [2][5], robust classification and text matching [4], and data-to-text generation [6].

**Microsoft Research Asia**                    Sep 2022-Present, Beijing, China
*Research Intern (Supervisors: Yeyun Gong, Nan Duan, Yelong Shen, Weizhu Chen)*
Worked on (1) synthetic prompting [1] which aims to elicit better reasoning in large language models with model-synthesized chain-of-thought demonstrations; (2) ITER-RETGEN [7] which synergizes retrieval and generation; (3) Critic [8] which teaches LLMs to correct themselves via interactions with tools.

**Huawei Noah's Ark Lab**                    Jun 2020-Oct 2020, Shenzhen, China
*Research Intern (Supervisors: Lifeng Shang, Qun Liu)*
Worked on neuro-symbolic reasoning [5] under a weakly-supervised setting, where we selected high-quality symbolic reasoning processes for training via mutual information maximization.

AWARDS

**1st Prize**, Comprehensive Scholarship, Tsinghua University                    2022
**2nd Prize**, Comprehensive Scholarship, Tsinghua University                    2021
**3rd Prize**, the National Final of "LAN QIAO CUP" C/C++ Group                    2018
**China National Scholarship**                    2017
**1st Prize**, National College Students Mathematics Competition (non-math-major)                    2016
**China National Scholarship**                    2016

SERVICES

**Reviewer/Program Committee:** ACL, EMNLP, NLPCC, ARR

TEACHING
ASSISTANT

**Artificial Neural Network**                    2019 Fall, 2020 Fall, 2021 Fall, 2022 Fall
*Instructor:* Minlie Huang

**Object-Oriented Programming**    2020 Spring, 2021 Spring, 2022 Spring, 2023 Spring
*Instructor:* Minlie Huang
*Also gave guest lectures and made assignments*