

# 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 recent work focused on (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, Yujia 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

<b>1st Prize</b> , Comprehensive Scholarship, Tsinghua University	2022
<b>2nd Prize</b> , Comprehensive Scholarship, Tsinghua University	2021
<b>3rd Prize</b> , the National Final of "LAN QIAO CUP" C/C++ Group	2018
<b>China National Scholarship</b>	2017
<b>1st Prize</b> , National College Students Mathematics Competition (non-math-major)	2016
<b>China National Scholarship</b>	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  
*Instructor: Minlie Huang*  
*Also gave guest lectures and made assignments*