

Silin Gao

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EDUCATION

École Polytechnique Fédérale de Lausanne (EPFL), School of Computer & Communication Sciences	Lausanne, Switzerland
Doctor of Philosophy (PhD) in Computer and Communication Sciences	Sep 2021 - Present
Tsinghua University, Department of Computer Science and Technology	Beijing, China
Research Assistant (RA) in Artificial Intelligence	Sep 2020 - Jun 2021
Tsinghua University, Department of Electronic Engineering	Beijing, China
Bachelors of Engineering (BE) in Electronic Information Science and Technology	Aug 2016 - Jun 2020
• GPA: 3.88/4.0 Rankings: 8/262	
Xinhua Middle School	Tianjin, China
Academic	Aug 2010 - Jun 2016

PUBLICATIONS

Efficient Tool Use with Chain-of-Abstraction Reasoning	[Paper]
Authors: Silin Gao , Jane Dwivedi-Yu, Ping Yu, Xiaoqing Ellen Tan, Ramakanth Pasunuru, Olga Golovneva, Koustuv Sinha, Asli Celikyilmaz, Antoine Bosselut, Tianlu Wang	
ArXiv preprint	
DiffuCOMET: Contextual Commonsense Knowledge Diffusion	[Paper]
Authors: Silin Gao , Mete Ismayilzada, Mengjie Zhao, Hiromi Wakaki, Yuki Mitsufuji, Antoine Bosselut	[Code]
Proceedings of the 62nd Annual Meeting of the Association for Computational Linguistics (ACL 2024)	
PeaCoK: Persona Commonsense Knowledge for Consistent and Engaging Narratives	[Paper]
Authors: Silin Gao , Beatriz Borges, Soyoung Oh, Deniz Bayazit, Saya Kanno, Hiromi Wakaki, Yuki Mitsufuji, Antoine Bosselut	
Proceedings of the 61st Annual Meeting of the Association for Computational Linguistics (ACL 2023)	[Code]
Outstanding Paper Award	
ComFact: A Benchmark for Linking Contextual Commonsense Knowledge	[Paper]
Authors: Silin Gao , Jena D. Hwang, Saya Kanno, Hiromi Wakaki, Yuki Mitsufuji, Antoine Bosselut	[Code]
Findings of the 2022 Conference on Empirical Methods in Natural Language Processing (EMNLP 2022)	
End-to-End Task-Oriented Dialog Modeling with Semi-Structured Knowledge Management	[Paper]
Authors: Silin Gao , Ryuichi Takanobu, Antoine Bosselut, Minlie Huang	[Code]
IEEE/ACM Transactions on Audio, Speech, and Language Processing (TASLP)	
HyKnow: End-to-End Task-Oriented Dialog Modeling with Hybrid Knowledge Management	[Paper]
Authors: Silin Gao , Ryuichi Takanobu, Wei Peng, Qun Liu, Minlie Huang	[Code]
Findings of the 59th Annual Meeting of the Association for Computational Linguistics (ACL-IJCNLP 2021)	
Paraphrase Augmented Task-Oriented Dialog Generation	[Paper]
Authors: Silin Gao , Yichi Zhang, Zhijian Ou, Zhou Yu	[Code]
Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics (ACL 2020)	
Integrating Discrete and Neural Features Via Mixed-Feature Trans-Dimensional Random Field Language Models	[Paper]
Authors: Silin Gao , Zhijian Ou, Wei Yang, Huifang Xu	[Code]
Proceedings of the 2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2020)	

HONORS AND AWARDS

ACL 2023 Outstanding Paper Award	ACL 2023 Best Paper Committee
Granted to 1% of the total submissions in ACL 2023.	Jul 2023
Outstanding Thesis in 2020 Diploma Projects	Tsinghua University
Top 2 thesis in Image and Signal Research Institution at Electronic Engineering Department.	Jul 2020
2017, 2018 and 2019 Academic Excellence Awards	Tsinghua University
Top 5% on GPA in the 2016-2017, 2017-2018 and 2018-2019 academic year.	Nov 2017, Nov 2018 and Nov 2019
2016 Freshmen Scholarship	Tsinghua University
Top 3 of 35,169 students in Tianjin on College Entrance Exam.	Aug 2016

RESEARCH AND WORK EXPERIENCE

Knowledge-Augmented Natural Language Inference and Understanding (PhD thesis project)

Sep 2021 - Present

Advisor: Antoine Bosselut, Natural Language Processing (NLP) Lab, EPFL

Lausanne, Switzerland

- Proposed a new benchmark, ComFact, for contextual commonsense knowledge linking. Knowledge retrievers trained on ComFact achieve $\sim 34\%$ absolute F1 boost over heuristics, which also yield $\sim 9.8\%$ relative improvement on a downstream dialogue generation task. Published an academic paper as 1st author, which is accepted to EMNLP 2022 findings.
- Proposed a new commonsense knowledge graph, PeaCoK, that represents world-level persona knowledge at scale. PeaCoK promotes the learning of reliable persona inference generators, which also enables more consistent and engaging downstream narrative modeling. Published an academic paper as 1st author, which is accepted to ACL 2023.
- Developing contextual commonsense knowledge generators based on diffusion models. Diffusion-based knowledge generators outperform auto-regressive baseline models, with better diversity and quality trade-off. Published an academic paper as 1st author, which is accepted to ACL 2024.
- **Current Research Interest:** multi-modal (video/storyboard) generation; knowledge augmentation and alignment; vision language models

Large Language Models as Generalists in Reasoning with Tools

Jun 2023 - March 2024

Supervisors: Tianlu Wang, Jane Yu and Asli Celikyilmaz, FAIR, Meta

Seattle, USA

- Developing a method to inspire large language models (LLMs) as generalists, which decouples the generic reasoning planning of LLMs from the domain-specific knowledge operations realized by external tools.
- LLMs trained as generalists achieve more accurate and efficient reasoning with tools in both math and Wikipedia-based question answering, which also present better 0-shot generalization abilities.
- Published an academic paper as 1st author, ArXiv preprint.

Semi-Structured Knowledge Management for End-to-End Task-Oriented Dialog Modeling

Sep 2020 - Feb 2022

Advisor: Minlie Huang, Conversational Artificial Intelligence (CoAI) Lab, Tsinghua University

Beijing, China

- Defined a task of modeling task-oriented dialog with management of semi-structured knowledge, and developed a modified version of MultiWOZ dataset (Mod-MultiWOZ) facing the defined task.
- Proposed several end-to-end task-oriented dialog systems to address the defined task, which use an extended belief tracking to manage semi-structured knowledge and achieve strong performances on the Mod-MultiWOZ dataset.
- Published two academic papers as 1st author, which are accepted to ACL 2021 findings and TASLP, respectively.

Paraphrase Augmented Task-Oriented Dialog Generation

Jun 2019 - Jul 2020

Advisor: Zhou Yu, Department of Computer Science, University of California, Davis

Davis, California, USA

- Proposed a method of excavating potential dialog function of user utterances in task-oriented dialog modeling, which is used to construct dialog paraphrases for data augmentation.
- Proposed a new framework of paraphrase augmented task-oriented dialog generation, which improves the task completion ability of state-of-the-art dialog models TSCP and DAMD on CamRest676 and MultiWOZ datasets, respectively.
- Published an academic paper as 1st author, which is accepted to ACL 2020.

Mixed-Feature Trans-dimensional Random Field Language Models for Speech Recognition

Mar 2019 - May 2020

Advisor: Zhijian Ou, Speech Processing and Machine Intelligence (SPMI) Lab, Tsinghua University

Beijing, China

- Proposed mixed-feature trans-dimensional random field language models (Mixed TRF LMs), which integrate both discrete n-gram features and neural-network-based features in a single-step model construction.
- Applied dynamic noise-contrastive estimation (dynamic NCE) to train Mixed TRF LMs and proved its outperformance in n-best list rescoring tasks on both PTB and Google one-billion-word datasets.
- Published an academic paper as 1st author, which is accepted for oral presentation at ICASSP 2020.

TECHNICAL SKILLS

Programming: Python, C/C++, HTML, Shell, MATLAB, SQL, Verilog

ML/AI: PyTorch, TensorFlow, Scikit-Learn

Languages: Chinese (Native), English (Fluent)

RELEVANT COURSEWORK

Computer Science: Machine Learning, Reinforcement Learning, Distributed Information Systems (information retrieval, natural language processing), Data and Algorithm (data structures and algorithms), Database Concepts, Computer Program Design (C/C++), Media and Cognition (artificial intelligence), Advanced Matlab Programming and Its Application, Operating System, Fundamental of Digital Logic and Processor (computer architecture and assembly language)

Others: Probability and Stochastic Processes, Linear Algebra, Discrete Mathematics, Calculus, Cognitive Psychology