Liliang Ren

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Research Interests

Deep Learning Architecture, Sequence Modeling, Language Models, Information Extraction, Dialogue Systems

Education

University of Illinois Urbana-Champaign (UIUC) — **Illinois, U.S.A.**
Ph.D. in Computer Science — *Aug. 2020 - Dec. 2024*
- **Advisor**: Prof. Chengxiang Zhai

University of California San Diego (UCSD) — **California, U.S.A.**
M.S. in Electrical and Computer Engineering — *Aug. 2018 - June 2020*
- **Advisor**: Prof. Julian McAuley

Shanghai Jiao Tong University (SJTU) — **Shanghai, China**
B.E. in Electrical and Computer Engineering — *Sept. 2014 - Aug. 2018*
- **Advisor**: Prof. Kai Yu

Publications [Google Scholar Profile]

[1] **Sparse Modular Activation for Efficient Sequence Modeling**
- **Liliang Ren**, Yang Liu, Shuohang Wang, Yichong Xu, Chenguang Zhu, ChengXiang Zhai.
- *In Proceedings of the 37th Conference on Neural Information Processing Systems*, **NeurIPS 2023**

[2] **C-PMI: Conditional Pointwise Mutual Information for Turn-level Dialogue Evaluation**
- **Liliang Ren**, Mankeerat Sidhu, Qi Zeng, Revanth Gangi Reddy, Heng Ji, ChengXiang Zhai.
- *In Proceedings of ACL2023 Workshop on Document-grounded Dialogue and Conversational Question Answering*, **ACL 2023 DialDoc**

[3] **Language Model Pre-Training with Sparse Latent Typing**
- **Liliang Ren***, Zixuan Zhang*, Han Wang, Clare Voss, ChengXiang Zhai and Heng Ji.
- *In Proceedings of The 2022 Conference on Empirical Methods in Natural Language Processing*, **EMNLP 2022 (Oral)**

[4] **HySPA: Hybrid Span Generation for Scalable Text-to-Graph Extraction**
- **Liliang Ren**, Chenkai Sun, Heng Ji and Julia Hockenmaier.
- *In Findings of The Joint Conference of the 59th Annual Meeting of the Association for Computational Linguistics and the 11th International Joint Conference on Natural Language Processing*, **ACL 2021 Findings**

[5] **Scalable and Accurate Dialogue State Tracking via Hierarchical Sequence Generation**
- **Liliang Ren**, Jianmo Ni and Julian McAuley.
- *In Proceedings of The 2019 Conference on Empirical Methods in Natural Language Processing*, **EMNLP 2019**

[6] **Towards Universal Dialogue State Tracking**
- **Liliang Ren**, Kaige Xie, Lu Chen and Kai Yu.
- *In Proceedings of The 2018 Conference on Empirical Methods in Natural Language Processing*, **EMNLP 2018 (Oral)**

[7] **Cost-Sensitive Active Learning for Dialogue State Tracking**
- Kaige Xie, Cheng Chang, **Liliang Ren**, Lu Chen and Kai Yu.
- *In Proceedings of The 19th Annual Meeting of the Special Interest Group on Discourse and Dialogue*, **SIGDIAL 2018**

(* denotes equal contribution)

Research Experiences

Microsoft Azure AI **Redmond, Washington**
Research Intern, Science on Large Models and NLP *Sept. 2023 - Present*

- **Advisor**: Yang Liu, Yelong Shen, Weizhu Chen
- Research on Length Extrapolable and Efficient Finetuning for Large Language Models.

Amazon Science **Seattle, Washington**
Applied Scientist Intern, PXTCS *May 2023 - Aug. 2023*

- Led a confidential project on Large Language Models (LLMs).
- Proposed and implemented an interpretable and parameter efficient fine-tuning approach for instruction tuning LLMs.
- Conducted extensive large-scale experiments on both confidential enterprise data and the open benchmarks to validate the effectiveness of the proposed approach.
- The proposed approach has been widely used among the research groups for customizing LLMs.

Microsoft Research **Redmond, Washington**
Research Intern, Knowledge and Language Team @ Azure CSR Group *Apr. 2022 - Aug. 2022*

- **Advisor**: Yang Liu, Shuohang Wang, Yichong Xu
- Proposed and implemented theory, design and the architecture of the Sparse Modular Activation mechanism and the SeqBoat model for efficient long sequence modeling.
- Conducted extensive large-scale experiments on various sequence modeling benchmarks such as enwik8, wiki103, Long Range Arena and Speech Commands.
- Published one 1st-author paper in NeurIPS 2023.

Text Information Management and Analysis Group at UIUC **Champaign, Illinois**
Research Assistant, IBM-Illinois Discovery Accelerator Institute *May 2021 - Present*

- **Advisor**: Chengxiang Zhai, Heng Ji, Jiawei Han
- Led a 6-person research team focusing on Language Modeling and Information Extraction.
- Proposed and implemented the architecture designs and the training objectives of Sparse Latent Typing, a pre-training framework that enables the latent type learning of sentence-level keywords using only self-supervision.
- Conducted extensive experiments for pre-training, few-shot evaluation and the analyses showing that the pre-trained model can extract meaningful and useful latent type representations.
- Published one 1st-author paper in EMNLP 2022 with oral presentation.

Natural Language Research Group at UIUC **Champaign, Illinois**
Research Assistant, Agriculture and Food Research Initiative *Oct. 2020 - May 2021*

- **Advisor**: Julia Hockenmaier, Heng Ji
- Led a 4-person research team focusing on Information Extraction.
- Proposed a general technique to invertibly map between an information graph and an alternating sequence conditioned on a given prior of graph traversal algorithm.
- Developed a novel neural decoder that is enforced to only generate alternating sequences in linear space and time complexities by decoding spans and types in a hybrid manner.
- Conducted experiments and demonstrated that the proposed model significantly outperforms the state-of-the-art on the joint entity and relation extraction task.
- Published one 1st-author paper in ACL 2021 Findings.

Julian McAuley's Lab at UCSD **La Jolla, California**
Research Assistant *Dec. 2018 - Aug. 2019*

- **Advisor**: Julian McAuley
- Led a 3-person research team focusing on Dialogue State Tracking.
- Unveiled the limitations of existing approaches on dialogue state tracking: their computational complexity increases proportionally to the number of pre-defined slots that need tracking.

- Proposed a novel Conditional Memory Relation Network that can track the dialogue states with the constant inference time complexity based on a hierarchical encoder-decoder structure.
- Conducted experiments and demonstrated that the proposed model scales easily with the increasing number of pre-defined domains and slots while maintaining the state-of-the-art performance.
- Published one 1st-author paper in EMNLP 2019.

Shanghai Jiao Tong University Speech Lab **Shanghai, China**
Research Assistant *May 2017 - Aug. 2018*

- **Advisor**: Kai Yu
- Led a 4-person research team focusing on Dialogue State Tracking.
- Unveiled generalizability and scalabiltity limitations of existing approaches when the slot-value pairs in ontology are updated dynamically.
- Proposed StateNet, a universal dialogue state tracker, which supports the dynamically changing ontology, and its number of model parameters is independent of the number of slots and values.
- Conducted experiments and demonstrated that StateNet significantly outperforms the performance of state-of-the-art approaches on two datasets.
- Published one 1st-author paper in EMNLP 2018 with oral presentation, and another 3rd-author paper in SIGDIAL 2018.

Skills

- Extensive working knowledge of Python, C/C++, Java, Latex, Vim, Git, Origin and Mathematica.
- Proficient in PyTorch, Mxnet and TensorFlow deep learning framework.

Awards and Honors

- *Honorable Mention*, Mathematical Contest in Modeling, 2017.
- *Gold medal*, China Southeast Mathematical Olympiad(CSMO), 2012.

Invited Talk

- July 2023: Sparse Modular Activation for Efficient Sequence Modeling, Microsoft Research, Redmond, Washington.

Teaching

- Fall 2020: CS 447 (Natural Language Processing), Teaching Assistant, University of Illinois Urbana-Champaign.

Professional Service

- Program Committee Member: ACL 2023, EMNLP 2023
- Conference Reviewer: EMNLP 2022, ICLR 2024
- Journal Reviewer: Soft Computing.
- Member: Tau Beta Pi Engineering Honor Society.