

Xiaoyin Chen

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EDUCATION

Mila, Université de Montreal Sept. 2023 – Present
Doctor of Philosophy, Computer Science, Advisor: Prof. Yoshua Bengio GPA: 4.00/4.00

Duke University Aug. 2021 – May 2023
Master of Science, Computer Science, Advisor: Prof. Sam Wiseman GPA: 4.00/4.00

University of California, Irvine Sept. 2016 – Mar. 2020
Bachelor of Science, Computer Science, Minor in Statistics GPA: 3.94/4.00, Major GPA: 3.99/4.00

PUBLICATIONS & PREPRINTS

Peer-reviewed conference, journal, and workshop

Structure Language Models for Protein Conformation Generation

Jiarui Lu*, Xiaoyin Chen*, Stephen Zhewen Lu, Chence Shi, Hongyu Guo, Yoshua Bengio, Jian Tang.
International Conference on Learning Representations 2025, <https://arxiv.org/abs/2410.18403>, 2024.

HarmAug: Effective Data Augmentation for Knowledge Distillation of Safety Guard Models

Seanie Lee, Haebin Seong, Dong Bok Lee, Minki Kang, Xiaoyin Chen, Dominik Wagner, Yoshua Bengio, Juho Lee, Sung Ju Hwang.
International Conference on Learning Representations 2025, <https://arxiv.org/abs/2410.01524>, 2024.

Proof Flow: Preliminary Study on Generative Flow Network Language Model Tuning for Formal Reasoning

Matthew Ho, Vincent Zhu, Xiaoyin Chen, Moksh Jain, Nikolay Malkin, Edwin Zhang.
System-2 Reasoning at Scale Workshop at NeurIPS 2024, <https://arxiv.org/abs/2410.13224>, 2024.

Inference and Verbalization Functions During In-Context Learning

Junyi Tao*, Xiaoyin Chen*, Nelson F. Liu.
Findings of Empirical Methods in Natural Language Processing (EMNLP) 2024, <https://arxiv.org/abs/2410.09349>, 2024.

Efficient Causal Graph Discovery Using Large Language Models

Thomas Jiralerspong*, Xiaoyin Chen*, Yash More, Vedant Shah, Yoshua Bengio.
AGI Workshop at ICLR 2024, <https://arxiv.org/abs/2402.01207>, 2024.

Learning Consistent Deep Generative Models from Sparse Data via Prediction Constraints

Gabriel Hope, Madina Abdrakhmanova, Xiaoyin Chen, Michael C. Hughes, Erik B. Sudderth.
4th Symposium on Advances in Approximate Bayesian Inference, 2022. arxiv.org/abs/2012.06718.

On the Current Failure – But Bright Future – of Topology-driven Biological Network Alignment

Siyue Wang, Xiaoyin Chen, Brent J. Frederisy, Benedict A. Mbakogu, Amy D. Kanne, Pasha Khosravi, Wayne B. Hayes.
Advances in Protein Chemistry and Structural Biology: Protein interaction networks, Volume 131.
<https://arxiv.org/abs/2204.11999>.

Cross-species Prediction of Protein Function by Global Network Alignment

Siyue Wang, Xiaoyin Chen, Brent J. Frederisy, Benedict A. Mbakogu, Amy D. Kanne, Pasha Khosravi, Giles R.S. Atkinson, Wayne B. Hayes.
28th Conference on Intelligent Systems for Molecular Biology (protein prediction track), 2020.
https://www.iscb.org/cms_addon/conferences/ismb2020/tracks/functioncosi.

Preprints & Under Review

BM25 Query Augmentation Learned End-to-End

Xiaoyin Chen, Sam Wiseman.
arXiv preprint arXiv: 2305.14087, <https://arxiv.org/abs/2305.14087>, 2023.

An Early Warning System for Democratic Resilience: Predicting Shocks to Civic Space

Xiaoyin Chen, Jeremy Springman, Erik Wibbels.
Technical report, 2022.

SELECTED PROJECTS

Interactive Inductive Reasoning

May 2024

- Introduced an interactive benchmark that allows agents to propose queries and iteratively refine hypotheses based on feedback from an oracle;
- Built from abstract inductive reasoning tasks, e.g., program synthesis, but the initial observations do not fully specify the underlying rules;
- Leveraged programs as the oracle to provide feedback on agent queries;
- Enhanced the evaluation of LLM reasoning by introducing information-seeking capabilities, in contrast to traditional static evaluations.
- Demonstrated that LLMs achieve higher accuracy in rule induction through active querying compared to a non-interactive environment.

Commonsense Reasoning via Knowledge Infused Text Generation

Dec. 2022

- Improved and implemented a general framework for applying arbitrary non-differentiable constraints to text generation inspired by cognitive Dual-System approach;
- Formulated text generation as a tree search problem and applied a modified Monte Carlo Tree Search algorithm;
- Utilized GPT-3 for fact checking to ensure the generated sentences are consistent with commonsense;
- Improved the average constraint satisfaction rate from 90.1% to 98.4% compared to the baseline.

Evaluating and Improving Logical Reasoning Capability with Syllogisms

Dec. 2022

- Proposed and implemented a pipeline for automatically generating logical questions without any human labeling;
- Developed an algorithm that samples logical questions in symbolic form by composing all 24 valid syllogisms;
- Written 100+ templates for verbalizing symbolic expressions to ensure the variety of utterances;
- Demonstrated that GPT-3 is unable to consistently infer syllogisms and generalize to a greater depth, even when all rules are given in the prompt;
- Improved logical QA accuracy on a human-written dataset by 3% by pre-training with synthetic data.

WORK EXPERIENCE

Visiting Researcher

Nov. 2024 – Present

ServiceNow Research, Montreal, Canada

- Worked on LLM agents.

Deep Learning Engineer Intern

Jul. 2018 – Sept. 2018

Tencent, Guangzhou, China

- Deep learning for semantic matching and information retrieval;
- Implemented and tested 8+ models from related papers;
- Proposed a novel padding method by dynamical expanding;
- Developed a joint model CNN and LSTM that achieved the best performance on the internal dataset.

TEACHING EXPERIENCE

Teaching Assistant

Duke University

- **CS590.05 Spring 2023:** Computational Biology.

Undergrad Tutor & Grader

University of California, Irvine

- **ICS-33 Spring 2017:** Intermediate Programming in Python;
- **ICS-46 Fall 2018:** Data Structure Implementation and Analysis in C++.

SERVICE

Reviewer: ACL, EMNLP, Neurips