Yi (Joshua) Ren

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Education

Ph.D. on Computer Science *Sep. 2020 - present*
Department of Computer Science, **University of British Columbia**

MSc. on Artificial Intelligence *Sep. 2018 - Sep. 2019*
School of Informatics, **University of Edinburgh** *High Distinction*

MEng. on Information and Communication Engineering *Sep. 2013 - May. 2016*
College of Electronic and Engineering, **Tongji University** *Top 3% GPA*

B.E. on Electronic Information Engineering *Sep. 2009 - Jun. 2013*
College of Electronic and Engineering, **Tongji University** *Top 5% GPA*

Experience

Borealis AI, Vancouver *Sep. 2023 - Dec. 2023*
Research Intern, supervisor: Dr. Tristan Sylvain *Vancouver, Canada*

- Disentangle the generating factors of time-series signals to improve prediction performance.
- Observing the learning dynamics of the model for the time-series dataset.

Mila - Quebec AI Institute *Aug. 2022 - Nov. 2022*
Research Intern, supervisor: Prof. Aaron Courville *Montreal, Canada*

- Explore the connections between iterated learning, self-supervised learning, and deep learning.
- Improving systematic generalization using iterated learning in general representation learning (published in NeurIPS 2023).

Department of Computer Science, University of British Columbia *Sep. 2020 - present*
Research Assistant, supervisor: Prof. Danica J. Sutherland *Vancouver, Canada*

- Explore where the simplicity bias comes from in supervised learning (and knowledge distillation).
- Explore how different parts of a network interact with each other, as agents.
- Explain the learning dynamics in pertaining and finetuning using NTK.

School of Informatics, University of Edinburgh *Jan. 2019 - Aug. 2019*
Research Assistant, supervisors: Prof. Simon Kirby and Prof. Shay Cohen *Edinburgh, UK*

- Explore how iterated learning can improve compositional generalization in a simple 2-agent setting.
- Designed and implemented multi-agent population models based on deep learning, so as two different language games.

Skills

Research Interest Learning dynamics in deep learning, Simplicity bias, Self-supervision, Iterated Learning, LLM
Programming Python, Pytorch, Jax (a little)

Services

Reviewer ICLR-2023, AISTATS-2023, NeurIPS-2023, ICLR-2024, NeurIPS-2024, AAAI-2025, ICLR-2025
Teaching Assistant CPSC322 (Intro. to AI), CPSC340 (ML and data mining), UBC, Vancouver
Organizing Workshop Language Gamification Workshop 2024 @ NeurIPS

Publications

Conference and Journals

- **Bias Amplification in Language Model Evolution: An Iterated Learning Perspective.**
  Yi Ren, Shangmin Guo, Linlu Qiu, Bailin Wang, Danica J. Sutherland; NeurIPS 2024
- **AdaFlood: Adaptive Flood Regularization.**
  Wonho Bae, Yi Ren, Mohamed Osama Ahmed, and et.al.; TMLR
- **Sample Relationship from Learning Dynamics Matters for Generalisation**
  Shangmin Guo, Yi Ren, Stefano V Albrecht, and Kenny Smith; ICLR, 2024
- **Improving Compositional Generalization using Iterated Learning and Simplicial Embeddings.**
  Yi Ren, Samuel Lavoie, Mikhail Galkin, Danica J. Sutherland, and Aaron Courville; NeurIPS, 2023
- **How to Prepare Your Task Head for Finetuning.**
  Yi Ren, Shangmin Guo, Wonho Bae, and Danica J. Sutherland; ICLR, 2023
- **Better Supervisory Signals by Observing Learning Paths.**
  Yi Ren, Shangmin Guo, and Danica J. Sutherland; ICLR, 2022
- **Expressivity of Emergent Language is a Trade-off between Contextual Complexity and Unpredictability.**
  Shangmin Guo, Yi Ren, Kory Mathewson, Simon Kirby, Stefano V. Albrecht, and Kenny Smith; ICLR, 2022
- **Compositional Language Emerge in a Neural Iterated Learning Model.**
  Yi Ren, Shangmin Guo, Matthieu Labeau, Shay B. Cohen, and Simon Kirby; ICLR, 2020

Pre-prints and Workshops

- **Learning Dynamics of LLM Finetuning.**
  Yi Ren, Danica J. Sutherland; Submitted to ICLR 2025
- **Economics Arena for Large Language Models**
  Shangmin Guo, Haochuan Wang, Haoran Bu, Yi Ren, and et.al.; Submitted to Workshop at NeurIPS 2024
- **Understanding Simplicity Bias towards Compositional Mappings via Learning Dynamics**
  Yi Ren, Danica J. Sutherland; Workshop on Compositional Learning at NeurIPS, 2024
- **Inductive Bias and Language Expressivity in Emergent Communication.**
  Shangmin Guo, Yi Ren, Agnieszka Słowik, and Kory Mathewson; 4th Workshop on Emergent Communication at NeurIPS, 2020
- **The Emergence of Compositional Languages for Numeric Concepts Through Iterated Learning in Neural Agents.**
  Shangmin Guo, Yi Ren, Sergii Gavrylov, and et.al.; Workshop on Emergent Communication at NeurIPS, 2019

Referees

Dr. Danica J. Sutherland (Thesis advisor) *dsuth@cs.ubc.ca*
- CIFAR AI Chair, Amii
- Department of Computer Science, University of British Columbia, Canada

Prof. Aaron Courville *aaron.courville@gmail.com*
- CIFAR AI Chair, Mila
- Department of Computer Science, Université de Montréal, Canada

Prof. Simon Kirby *simon.kirby@ed.ac.uk*
- Centre for Language Evolution, Linguistics and English Language
- School of Philosophy, Psychology and Language Sciences, University of Edinburgh, UK

Dr. Shay Cohen *scohen@inf.ed.ac.uk*
- Insitute for Language, Cognition and Computation
- School of Informatics, University of Edinburgh, UK