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**

With A2 Distinction (GPA 81%)

- Thesis: Enhance the Compositionality of Emergent Language by Iterated Learning.

MEng. on Information and Communication Engineering
Sep. 2013 - May. 2016

College of Electronic and Engineering, **Tongji University**

Rank: 2/33 (GPA 88%)

- Thesis: Optimal Power Control and Resource Allocation in D2D-based Vehicular Communication Networks.

B.E. on Electronic Information Engineering
Sep. 2009 - Jun. 2013

College of Electronic and Engineering, **Tongji University**

Rank: 6/45 (GPA 89%)

- Thesis: Implementing the OFDM based physical layer on FPGA. (Outstanding thesis award in Tongji University)

Experience

Department of Computer Science, University of British Columbia
Sep. 2020 - present

Research Assistant, supervisor: Dr. Danica J. Sutherland

Vancouver, Canada

- Explore the role played by supervisory signal in classification tasks.
- Explore how to design good referential tasks in emergent communication games.
- Accomplish one conference paper and one workshop paper.

School of Informatics, University of Edinburgh
Jan. 2019 - Aug. 2019

Research Assistant, supervisors: Prof. Simon Kirby and Dr. Shay Cohen

Edinburgh, UK

- Self-propose a project of applying iterated learning to referential language games as the master's thesis.
- Designed and implemented multi-agent population models based on deep learning, so as two different language games.
- Accomplished two top conference papers (accepted by EmCom@NeurLPS 2019 and ICLR 2020)

Wireless Network R&D Center, Huawei
May. 2016 - July. 2018

Research Scientist, Department of RAN Research

Shanghai, China

- Co-authored proposals and US patents for 5G Next Generation Radio Access Network to The 3rd Generation Partnership Project (3GPP) and the Institute of Electrical and Electronics Engineers (IEEE).
- Lead the project of AI on Site. Propose a machine-learning-based algorithm to enhance the performance of channel estimation in the 5G radio access network. The algorithm is successfully implemented in a 5G commercial prototype.

Publications

Machine Learning and Natural Language Processing

- [C1] Yi Ren, Shangmin Guo, and Danica J. Sutherland, "Better Supervisory Signals by Observing Learning Paths." *Under review*
- [C2] Shangmin Guo, Yi Ren, Kory Mathewson, Simon Kirby, and et.al., "Expressivity of Emergent Language is a Trade-off between Contextual Complexity and Unpredictability." *Under review*
- [C3] Shangmin Guo, Yi Ren, Agnieszka Słowik, and Kory Mathewson, "Inductive Bias and Language Expressivity in Emergent Communication." *4th Workshop on Emergent Communication at Neural Information Processing Systems (NeurIPS), 2020*
- [C4] Yi Ren, Shangmin Guo, Matthieu Labeau, Shay B. Cohen and Simon Kirby, "Compositional Language Emerge in a Neural Iterated Learning Model." *International Conference on Learning Representations (ICLR), 2020*
- [C5] Shangmin Guo, Yi Ren, Sergii Gavrylov, Stella Frank, Ivan Titov and Kenny Smith, "The Emergence of Compositional Languages for Numeric Concepts Through Iterated Learning in Neural Agents." *3rd Workshop on Emergent Communication at Neural Information Processing Systems (NeurIPS), 2019*

Wireless Communication and Signal Processing

- [J1] Yi Ren, Fuqiang Liu, Zhi Liu, Chao Wang, and Yusheng Ji, "Power Control in D2D-based Vehicular Communication Networks," *IEEE Transactions on Vehicular Technology*, vol.64, no.12, pp.5547-5562, Oct. 2015.
- [J2] Dong Liu, Erwu Liu, Yi Ren, Zhengqing Zhang, and et.al., "Bounds on Secondary User Connectivity in Cognitive Radio Networks", *IEEE Communications Letters*, vol.19, no.4, pp.617-620, Apr. 2015.
- [J3] Dong Liu, Erwu Liu, Zhengqing Zhang, Rui Wang, Yi Ren, and et.al., "Secondary Network Connectivity of Ad Hoc Cognitive Radio Networks", *IEEE Communications Letters*, vol.18, no.12, pp.2177-2180, Dec. 2014.

- [C1] Meiyan, Wu, Yi Ren, et al. "Location-Partition-Based Resource Allocation in D2D-Supported Vehicular Communication Networks." *IEEE 87th Vehicular Technology Conference (VTC-Spring), 2018*
- [C2] Yi Ren, Chao Wang, Dong Liu, and Fuqiang Liu, "Applying LTE-D2D to Support V2V Communication Using Local Geographic Knowledge", *IEEE 82nd Vehicular Technology Conference (VTC-Fall), 2015*

Referees

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

Skills

Programming	Python, Pytorch, Matlab, Mathematica, Verilog (a little)
Highlight Courses	Machine Learning and Pattern Recognition, Probability Modeling Reasoning, Natural Language Understanding, Information Theory, Stochastic Digital Signal Processing, Convex Optimization