

Qingfeng Lan

Curriculum Vitae

University of Alberta
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📄 <https://lancelqf.github.io/>

I'm a PhD student at the University of Alberta, Canada. I'm interested in designing simple and efficient algorithms supported by sound theories in artificial intelligence. In particular, my research focuses on reinforcement learning and representation learning.

Education

- 2020 - Present **Doctor of Philosophy in Computing Science**, *University of Alberta*, Canada.
Advisor Rupam Mahmood
- 2018 - 2020 **Master of Science in Computing Science**, *University of Alberta*, Canada.
Advisor Alona Fyshe
- 2014 - 2018 **Bachelor of Engineering in Computer Science and Technology**, *University of Chinese Academy of Sciences*, China.
Advisors Yanyan Lan (thesis advisor), Guojie Li (tutor)
- 17.10 - 18.03 **Visiting Non-Matriculated Programme**, *University of Oxford*, England.
Tutor Leslie Ann Goldberg

Research

- 21.08 - Present **Memory Efficient Reinforcement Learning with Knowledge Consolidation.**
- Replaced the experience replay in DQN with knowledge consolidation and pseudo-state sampling
 - Showed the proposed algorithm is much more memory efficient while achieving similar performance and sample efficiency compared to DQN
 - In submission
- 20.09 - 21.02 **Model-free Policy Learning with Reward Gradients.**
- Introduced a novel policy gradient estimator, the Reward Policy Gradient estimator, that integrates the reward gradients
 - Developed the first model-free policy gradient method to utilize reward gradients — Reward Policy Gradient (RPG) algorithm, and showed that RPG outperforms Proximal Policy Optimization (PPO) on several continuous control tasks
 - Provided a theoretical framework that unifies several existing policy gradient methods based on the reparameterization estimator
- 19.06 - 20.06 **Predictive Representation Learning for Language Modeling.**
- Proposed Predictive Representation Learning (PRL) which explicitly constrains Long Short Term Memory networks (LSTMs) to encode specific predictions by general value functions
 - Improved the convergence rate and data efficiency of two strong language modeling methods significantly

- 2019.09 - 12 **Reducing Selection Bias in Counterfactual Reasoning for Individual Treatment Effects Estimation.**
- Proposed a new graphical model which includes the latent variables of the observed features
 - Explicitly removed selection bias by separating the learned representations of features into parts
- 2019.04 - 09 **Maxmin Q-learning: Controlling the Estimation Bias of Q-learning.**
- Highlighted that the effect of overestimation bias on learning efficiency is environment-dependent
 - Proposed a new variant of Q-learning algorithm called Maxmin Q-learning which provides a parameter-tuning mechanism to flexibly control bias
- 2017.07 - 09 **A Deep Top-K Relevance Matching Model for Ad-hoc Retrieval.**
- Proposed a deep relevance matching model for ad-hoc retrieval problem
 - Leveraged Top-K pooling to capture the details of interaction scores and applied term gating networks to control the contribution of each query term to the final matching score

Employment

- 2019 - Present **Research Assistant**, *Alberta Machine Intelligence Institute, University of Alberta, Edmonton, Canada.*
- 17.07 - 18.04 **Research Assistant**, *Key Laboratory of Network Data Science and Technology, Chinese Academy of Sciences, Beijing, China.*

Publications

Refereed Articles

- ICLR-2020 **Maxmin Q-learning: Controlling the Estimation Bias of Q-learning.**
Qingfeng Lan, Yangchen Pan, Alona Fyshe, Martha White. *International Conference on Learning Representations, 2020.*
- CCIR-2018 **A Deep Top-K Relevance Matching Model for Ad-hoc Retrieval.**
 Zhou Yang, **Qingfeng Lan**, Jiafeng Guo, Yixing Fan, Xiaofei Zhu, Yanyan Lan and Yue Wang, Xueqi Cheng. *China Conference on Information Retrieval, 2018. Best Paper Award Candidate.*

Non-Refereed Articles

- Under Review **Model-free Policy Learning with Reward Gradients.**
Qingfeng Lan, Samuele Tosatto, Homayoon Farrahi, A. Rupam Mahmood. *arXiv preprint arXiv:2103.05147, 2021*
- arXiv Preprint **Predictive Representation Learning for Language Modeling.**
Qingfeng Lan, Luke Kumar, Martha White, Alona Fyshe. *arXiv preprint arXiv:2105.14214, 2021*
- NeurIPS-2019 **Reducing Selection Bias in Counterfactual Reasoning for Individual Treatment Effects Estimation.**
 Zichen Zhang, **Qingfeng Lan**, Lei Ding, Yue Wang, Negar Hassanpour, Russell Greiner. *NeurIPS Workshop on Causal Machine Learning, 2019. Poster Spotlight.*

Academic Services

- JMLR Journal of Machine Learning Research, 2020.

Open-Source Code

Explorer.

A reinforcement learning frame based on Pytorch for exploring new ideas.

Gym Games.

A gym compatible version of various games for reinforcement learning.

Teaching Experience

Winter 2019 **Teaching Assistant**, *University of Alberta*, Edmonton, Canada.
CMPUT 175: Introduction to the Foundations of Computation II

Fall 2018 **Teaching Assistant**, *University of Alberta*, Edmonton, Canada.
CMPUT 174: Introduction to the Foundations of Computation I

Computer skills

Advanced Python, PyTorch
Intermediate Tensorflow, Keras, C/C++
Basic PennyLane, Octave/MATLAB, Verilog, Haskell