Tengyang Xie

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RESEARCH INTERESTS

Reinforcement learning, **Nonconvex optimization**, **Deep learning and its theory**, **Differential privacy**, **Algorithmic fairness**, **Robust and reliable decision making**

EDUCATION

University of Massachusetts Amherst — Amherst, MA
Ph.D. Student – Computer Science (GPA: 4.0/4.0) — Sep. 2016 – Present
Advisors: Gerome Miklau, Philip S. Thomas

University of Science of Technology of China — Hefei, Anhui, China
Bachelor of Science – Physics (Major GPA: 4.0/4.3) — Sep. 2012 – Jun. 2015
Undergraduate Student – Mathematics (Major GPA: 4.0/4.3) — Sep. 2011 – Aug. 2012

PUBLICATIONS

[1]. **Tengyang Xie***, Bo Liu*, Yangyang Xu, Mohammad Ghavamzadeh, Yinlam Chow, Daoming Lyu, Daesub Yoon. (2018). A Block Coordinate Ascent Algorithm for Mean-Variance Optimization. In *32nd Conference on Neural Information Processing Systems (**NIPS 2018**)*. (* indicating equal contribution)

PREPRINTS

[2]. **Tengyang Xie**, Yu-Xiang Wang, Yifei Ma. (2018). Marginalized Off-Policy Evaluation for Reinforcement Learning. In preparation. (Spotlight presentation at the NIPS 2018 Workshop on Causal Learning)

[3]. **Tengyang Xie**, Philip S. Thomas, Gerome Miklau. (2018). Privacy Preserving Off-Policy Evaluation. In submission to AAMAS 2019.

EXPERIENCE

Amazon AI — Palo Alto, CA
Research Intern — May 2018 – Aug. 2018
Mentors: Yu-Xiang Wang, Yifei Ma

- Investigated the statistical foundation for off-policy reinforcement learning. Explored the potential for using off-policy reinforcement learning in the dialogue system, which enables the system to obtain a good policy from training data from bad policies.
- Proposed a new marginalized framework for designing the estimators of off-policy evaluation. This marginalized framework could be used directly in any importance sampling based estimators, and reduce the mean square error by several orders of magnitude. (Paper in preparation)

University of Massachusetts Amherst — Amherst, MA
Research Assistant — Sep.2016 – Present
Advisors: Gerome Miklau, Philip S. Thomas

- Research on the optimization problems arising out of reinforcement learning problems, differential privacy, and robust decision making. Explored the trade-off among accuracy, fairness and privacy.
- Proposed differentially private approaches for off-policy evaluation. The problem of off-policy evaluation is critical when running bad policy is costly and dangerous, and it has been widely used in the decision making for the sensitive problems. This is the first differentially private approach for the problem of off-policy evaluation. (Paper in preparation)

University of Science and Technology of China Hefei, Anhui, China
Research Assistant 2015 – 2016
Advisor: Kai Xing

- Research on data mining and networking. We proposed an acoustic localization approach which is the first post-disaster remote localization approach that is robust against most harsh environments in underground disasters, and implemented it by extensive experimental study in an operating coal mine.

Hefei National Laboratory for Physical Sciences at the Microscale Hefei, Anhui, China
Research Assistant 2013 – 2015
Advisor: Zhenyu Zhang

- Research on condensed matter theory and topological insulator.

KEY PROJECTS

Statistical Foundation for Off-policy Reinforcement Learning 2018 – Present

- Proposed a new genetic framework for off-policy evaluation, especially for the case with long horizon. This framework can be adopted in most of the popular existed methods with statistical and could improve the performance by one or even several orders of magnitude. (Paper in preparation)
- Working on the problem of off-policy policy gradient. Proposed a method for off-policy policy gradient which is easy for the practical use and supported by provable guarantees.

Safe and Private-preserving Reinforcement Learning 2017 – Present

- Proposed the first differential private off-policy evaluation algorithm. (Paper in preparation)
- Working on the problem of robust off-policy evaluation, where a small fraction of data are subject to arbitrary adversarial noise.

Risk-sensitive Reinforcement Learning 2017 – 2018

- Proposed one of the first approaches that provide risk-sensitive reinforcement learning algorithms with provable sample complexity analysis.
- Provided the first finite-sample analysis for cyclic block coordinate descent for nonconvex optimization.
- **Paper accepted by NIPS 2018**.

REVIEWING EXPERIENCE

Conference Reviewer: ICML 2019, AAAI 2019
Auxiliary Conference Reviewer: PODS 2017

TEACHING EXPERIENCE

Teaching Assistant at University of Massachusetts Amherst:

- Introduction to Simulation (CS590M), Prof. Peter J. Haas Spring 2018
- Introduction to Programming with Python (CS119), Prof. William T. Verts Fall 2017

SELECTED COURSEWORKS

Computer Science: Machine Learning, Probabilistic Graphic Model, Reinforcement Learning, Advanced Algorithm, More Advanced Algorithms, Interactive Machine Learning

Mathematics & Physics: Probability Theory, Mathematical statistics, Real Analysis, Complex Analysis, Functional Analysis, Statistical Physics, Quantum Mechanics, Advanced Quantum Mechanics, Computational Physics (Monte Carlo Methods)

SELECTED HONORS AND AWARDS

NIPS Travel Award 2018

The Mathematical Contest in Modeling (MCM), Honorable Mention	2014
Outstanding Student Scholarship, Silver Medalist (Top 10%)	2013, 2014
Outstanding Student Scholarship, Bronze Medalist (Top 20%)	2012
Outstanding Freshmen Scholarship	2011
China National Physics Olympiad, First Prize	2010
China National Physics Olympiad, Second Prize	2009
China National Mathematical Olympiad, Second Prize	2009

SKILLS

Python, C/C++, Tensorflow, PyTorch, MXNet, Matlab, Mathematica, LaTeX...

REFERENCE

Available upon request.