

ZHIYUAN FAN

fanzy@mit.edu ◊ fan-zhiyuan.org

EDUCATION

- **Tsinghua University, Bachelor of Computer Science and Technology.** Sept. 2019 - June. 2023
- Institute for Interdisciplinary Information Science. (Also known as Yao Class, founded by Prof. Andrew Yao in 2005.)
- Overall GPA 3.91/4.00, Top 25%.
- Relevant Courses: Machine Learning (A), Algorithm Design (A+), Theory of Computation (A+), Fundamentals of Cryptography (A+), Game Theory (A), Mathematics for Computer Science (A), Causal and Statistical Learning (A).
- **Yao Award**, Silver Medal. *Yao Award is established to recognize the outstanding performances of Yao Class students.*

RESEARCH INTERESTS

- Learning Theory, Algorithms.

PUBLICATIONS

(* stands for equal contribution)

- **Efficient Algorithms for Sparse Moment Problems without Separation.**
Zhiyuan Fan & Jian Li. (alphabet order)
Accepted at the 36th Annual Conference on Learning Theory (COLT 2023).
- **On the Interplay Between Misspecification and Sub-optimality Gap in Linear Contextual Bandits.**
Weitong Zhang, Jiafan He, Zhiyuan Fan & Quanquan Gu.
Accepted at the 40th International Conference on Machine Learning (ICML 2023).
- **OpenFE: Automated Feature Generation beyond Expert-level Performance.**
Tianping Zhang, Zheyu Zhang, Zhiyuan Fan, Haoyan Luo, Fengyuan Liu, Wei Cao & Jian Li.
Accepted at the 40th International Conference on Machine Learning (ICML 2023).
- **The Exact Complexity of Pseudorandom Functions and the Black-Box Natural Proof Barrier.**
Zhiyuan Fan, Jiayu Li & Tianqi Yang. (alphabet order)
Accepted at the 54th Annual ACM Symposium on Theory of Computing (STOC 2022).
Best Student Paper co-winner. Invited to **Special Issue of SICOMP**.

PREPRINTS

- **Generalized Uniform-PAC Guarantees for Misspecified Linear Markov Decision Processes.**
Zhiyuan Fan*, Weitong Zhang*, Jiafan He & Quanquan Gu.
Submitted to NeurIPS 2023.

RESEARCH EXPERIENCE

- **Unified Algorithm for Linear Bandits, UCLA.** June. 2022 - Oct. 2022
- Advisor: Prof. Quanquan Gu
- Based on an observation that feel-good Thompson sampling can be regarded as an EXP4-type algorithm, we proposed a unified framework for linear contextual bandits. The new algorithm achieves nearly minimax optimal regret in various settings and resolves the respective open problem in each setting.
- **Gap-dependent Misspecified Linear Bandits, UCLA.** June. 2022 - Oct. 2022
- Advisor: Prof. Quanquan Gu
- I found a better analysis for the existing analysis and improved the gap-dependent regret bound for linear contextual bandits. This improvement closes the gap in the existing result and demonstrates a sharp phase transition for the learnable region on the interplay between misspecification and sub-optimality gap.

- **The Complexity of Pseudorandom Functions**, Tsinghua University. July. 2021- Oct. 2021
 - Course Project for Fundamentals of Cryptography
 - Based on the new efficient construction for hash functions, we showed that pseudorandom functions could be constructed in extremely low circuit complexity in various circuit families. The construction is nearly-optimal as we presented tight lower bounds correspondingly.
- **On Sparse Moment Problems**, Tsinghua University. June. 2021- June. 2022
 - Advisor: Prof. Jian Li
 - Based on an observation of the connection between Vandermonde linear systems and Schur polynomials, we proposed an efficient algorithm that is a robust version of Prony's method for learning mixtures of discrete distribution from noisy moments. It is the first algorithm that runs in quadratic time and achieves theoretical optimal error bound for this problem without extra restricting assumptions. The new result improves all previous algorithms for this problem.

AWARDS AND HONORS

- **Yao Award**, Silver Medal (3/62) 2022
- **STOC 2022**, Danny Lewin Best Student Paper Award 2022
- Scholarship of Tsinghua University
 - Scientific Innovation Excellence Award 2022
 - Academic Excellence Award (twice) 2021, 2022
- International Collegiate Programming Contest
 - ICPC Asia Shanghai Regional Contest, Gold Medal (rank 2) 2019
 - ICPC Asia-East Continent Final Contest, Gold Medal 2019
- China Collegiate Programming Contest
 - CCPC Qinghuangdao Regional Contest, Gold Medal (rank 2) 2019
- Chinese National Olympiad in Informatics, Gold Medal (twice) 2017, 2018

SKILLS

- **Programming Languages:** C++, Python, Go, SQL, MATLAB
- **Tools and Frameworks:** PyTorch, Matplotlib, \LaTeX , Git, MySQL