DONGCHEN LI

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EDUCATION

Peking University, China *Sep. 2019 - Present*
Bachelor of Information and Computational Sciences, School of Mathematical Sciences
Overall GPA: 3.65/4.00 **Rank**: 4/18
GRE: 324 (154+170) + AW3.0 **TOEFL**:103 (R:30, L:27, S:21, W:25)
Advanced Courses: Functional Analysis, Algorithms for Combinatorial Optimization, Fundamentals of Theoretical Computer Science, Applied Stochastic Processes (Honor), Numerical Optimization.

RESEARCH INTERESTS

My research interests include algorithmic game theory, theory of computation and other problems at the interface between computer science, mathematics, and operations research. Recently, I'm focusing on developing approximation algorithms with low complexity as well as solid performance guarantee.

PUBLICATIONS

Modified Tasknakis-Spriakis Algorithm, Dongchen Li, Hanyu Li, Xiaotie Deng, submitted to AAMAS2023.

RESEARCH EXPERIENCE

daGame Lab, Peking University **Adivisor: Prof. Xiaotie Deng**
Algorithm for Approximate Nash Equilibrium *May. 2022- Present*

- In order to understand the lower bound of the performance of the present approximation algorithms, we create a novel optimization method to measure their performance.
- Different from traditional approximation algorithms, we propose efficient algorithms with complexity $O(n \log n), O(n^3)$ to achieve exactly the point of minimal regret in given 2 or 3 dimensional areas. We are the first to split the spaces into linear pieces to achieve the exact Nash Equilibrium.
- One paper has been submitted to AAMAS 2023.

Understanding PPAD and beyond *Jul.2021- Mar. 2022*

- To understand the gap between theory and reality, I read widely about the classical materials to learn the techniques of the PPAD-completeness of Nash Equilibrium normal form game and the PSPACE-completeness of Lemeke-Howson Method and Homotopy Method.
- Necklace splitting is an interesting problem to do with fixed-point theory. The recent progress on its complexity intrigues many attentions. I learned the techniques of reductions about the newly proposed PPA-k complexity class and its similarity with the approach of PPAD-completeness.
- Furthermore, based on our knowledge, we understood the topology essence of EOL related complexity classes such as Brouwer, Tucker, Borsuk-Ulam and Sperner. We also tried to apply it on the Quantal Response Equilibrium.

Cheating in Correlated Equilibrium *Oct. 2021- Dec. 2021*

- Benefiting from the introduction of trusted third party, cheating in correlated equilibrium is a widely used extension of Nash Equilibrium. However, the players can gain profits through misrepresenting their payoffs. So, it's important to measure the incentive of the player to cheat in the correlated equilibrium. We investigated about the upper bound of a player's gain when he cheats in the correlated equilibrium by taking advantage of optimization methods such as KKT conditions and Farkas Lemma.

AWARDS AND HONORS

High School:

- Silver Medal in Chinese Mathematical Olympiad, Top 170 national wide *Oct. 2018*

College:

- Merit Student in Peking University (Top 25%, Yizheng Scholarship) *Sep. 2021*
- Academic Excellence Award *Sep. 2020*
- Second-Class Freshmen Scholarship *Sep. 2019*