

Kai Wang

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Education

Harvard University

Ph.D. in Computer Science

Advised by Professor Milind Tambe

2017 - Present

Massachusetts, United States

National Taiwan University

B.S. in Electrical Engineering and Mathematics

Overall GPA: 4.07/4.3 Major GPA: 4.13/4.3(EE) 4.03/4.3(Mathematics)

2012 - 2017

Taipei, Taiwan

Honors

USC Asian Pacific Alumni Association

Scholarship

2018 - 2019

Google Code Jam

Advanced in Round 3

2019

International Mathematical Olympiad

Silver Medals

2010, 2011

Research and Technical Experience

Optimization in Multi-agent Systems

- Solved optimization problems in multi-agent systems with non-cooperative decentralized agent behavior.
- Studied the hardness of solving equilibria in multi-agent systems and proposed approximate algorithms to find approximate solutions.

Differentiable Optimization

- Integrated optimization and decision-making problems as a differentiable layer in the training pipeline, enabling optimization layer to be chained end-to-end in the training pipeline.
- Proposed a sub-sampling approach and a surrogate approach to improve the scalability of the differentiable optimization layer.
- Applied such approach to real domains in wildlife conservation, movie recommendation, and portfolio optimization to demonstrate its improvement in solution quality and scalability.

Illegal Smuggling Prevention: Application of Differentiable Optimization in Multi-agent Systems

- We expressed decision-making process of agents as a differentiable optimization layer, where the end-to-end differentiable optimization approach can be adopted to improve the overall performance.
- We applied such AI-powered approach to protect important targets against malicious attackers, e.g., endangered animals and vulnerable infrastructures, by smartly allocating limited security resources.

Work Experience

BravoAI

Software Engineer & Co-Founder

- Developed API and system for a new Chinese-based search chatbot.
- Led the front-end development of our customized chatbot interface.

March 2017 - July 2017

Taipei, Taiwan

Mixerbox Incorporation

Software Engineer Intern

- Developed music language recognition and implemented a global automatic music recommender system.
- Developed music similarity recognition to detect cover songs.
- Implemented a crawler to retrieve effective data from Google Play Store and visualize the App ranking history.
- Applied users' installation lists to implement collaborative filtering with matrix factorization for recommender system.

April 2016 - March 2017

Taipei, Taiwan

Conference Publications

- **Kai Wang**, Bryan Wilder, Andrew Perrault, and Milind Tambe
“Automatically Learning Compact Quality-aware Surrogates for Optimization Problems”, under review.
- Lily Xu, Elizabeth Bondi, Fei Fang, Andrew Perrault, **Kai Wang**, and Milind Tambe
“Dual-Mandate Patrols: Learning While Patrolling in Green Security Domains”, under review.
- Ayan Mukhopadhyay, **Kai Wang**, Andrew Perrault, Mykel Kochenderfer, Milind Tambe, and Yevgeniy Vorobeychik
“Robust Spatial-Temporal Incident Prediction”, in *Conference on Uncertainty in Artificial Intelligence 2020*.
- **Kai Wang**, Andrew Perrault, Aditya Mate, and Milind Tambe.
“Scalable Game-Focused Learning of Adversary Models: Data-to-Decisions in Network Security Games”, in *International Conference On Autonomous Agents and Multi-Agent Systems 2020*.
- Nitin Kamra, Umang Gupta, **Kai Wang**, Fei Fang, Yan Liu, Milind Tambe.
“DeepFP for Finding Approximate Nash Equilibrium in Continuous Action Spaces”, *Conference on Decision and Game Theory for Security 2019*
- Sarah Cooney, **Kai Wang**, Elizabeth Bondi, Thanh Nguyen, Phebe Vayanos, Hailey Winetrobe, Edward Cranford, Cleotilde Gonzalez, Christian Lebiere, and Milind Tambe.
“Learning to Signal in the Goldilocks Zone: Improving Adversary Compliance in Security Games”, *European Conference on Machine Learning 2019*.
- Nitin Kamra, Umang Gupta, **Kai Wang**, Fei Fang, Yan Liu, Milind Tambe.
“Deep Fictitious Play for Games with Continuous Action Spaces”, extended abstract in *International Conference On Autonomous Agents and Multi-Agent Systems 2019*.
- Sara Marie Mc Carthy, Corine Laan, **Kai Wang**, Phebe Vayanos, Milind Tambe, and Arunesh Sinha.
“The Price of Usability: Designing Operationalizable Strategies for Security Games”, in *International Joint Conference on Artificial Intelligence 2018*.
- **Kai Wang**, Qingyu Guo, Phebe Vayanos, Milind Tambe, and Bo An.
“Equilibrium Refinement in Security Games with Arbitrary Scheduling Constraints”, in *International Conference On Autonomous Agents and Multi-Agent Systems 2018*.
- Haifeng Xu, **Kai Wang**, Phebe Vayanos, and Milind Tambe.
“Strategic Coordination of Human Patrollers and Mobile Sensors with Signaling for Security Games”, in *Association for the Advancement of Artificial Intelligence 2018*.

Workshop Publications

- **Kai Wang**.
“Balance Between Scalability and Optimality in Network Security Games”, *International Conference On Autonomous Agents and Multi-Agent Systems 2020 Doctoral Consortium*
- **Kai Wang**, Bryan Wilder, and Milind Tambe.
“Adversarial Machine Learning with Double Oracle”, *International Joint Conference on Artificial Intelligence 2019 Doctoral Consortium*
- **Kai Wang**, Bryan Wilder, Sze-chuan Suen, Milind Tambe, and Bistra Dilkina.
“Improving GP-UCB Algorithm by Harnessing Decomposed Feedback”, *European Conference on Machine Learning 2019 SoGood Workshop*
- Sarah Cooney, Wendy Gomez, **Kai Wang**, Jorja Leap, P. Jeffery Brantingham, and Milind Tambe.
“Mobile Game Theory with Street Gangs”, *European Conference on Machine Learning 2019 SoGood Workshop*
- **Kai Wang**, Hong-Jyun Wang, and Ho-Lin Chen.
“Routing Games with Priorities”, in *Asian Association for Algorithms and Computation 2016* (Oral Presentation)

Teaching and Leadership Experience

Teaching Fellow

Spring 2020

Harvard CS 127/227 Cryptography

- Held office hours to help with homeworks and led the discussion in class.
- Advised students' final projects in the advanced cryptography.

President

August 2013, August 2015

IMO Summer Camp

- Provided opportunities for high school students to learn about advanced math.
- Attracted the interest of students by customized lectures, challenging contest, and interesting boardgames.
- The camp has incubated several IMO medalists in the next few years and many MIT undergrad students too.

Captain

June 2014 - June 2015

National Taiwan University Varsity Volleyball Team

- Led the team to the 3rd place in the national final round.

Professional Service

Program Committee IJCAI AI4SG workshop 2020, 2019, IJCAI AIWC workshop 2018

Subreviewer NeurIPS 2020, AAMAS 2020, AAAI 2020