Kai Wang

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Education

Harvard University 2017 - Present
Ph.D. in Computer Science *Massachusetts, United States*
Advised by Professor Milind Tambe

National Taiwan University 2012 - 2017
B.S. in Electrical Engineering and Mathematics *Taipei, Taiwan*
Overall GPA: 4.07/4.3 Major GPA: 4.13/4.3(EE) 4.03/4.3(Mathematics)

Honors

Google Code Jam 2019
Advanced in Round 3, ranked 484th worldwide

International Mathematical Olympiad 2010, 2011
Silver Medals

Research and Technical Experience

Non-cooperative Games and Stackelberg Security Games

- Researched the non-cooperative behavior of players and the equilibrium in multi-agent systems.
- Studied the hardness of solving equilibrium and proposed approximate algorithms to find approximate solutions.
- Applied the game theory model to security problems, traffic routing, and wildlife conservation.

Differentiable Optimization and Decision-making Problems

- Integrated optimization and decision-making problem as a differentiable layer in the training pipeline, which can be trained end-to-end and achieve better performance against ordinary training methods.
- 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 show the improvement in solution quality and scalability.

Application of Network Interdiction Games and Differentiable Optimization: Illegal Smuggling Prevention

- Applied game theory and machine learning to protect important targets in a network, e.g., endangered animals and vulnerable infrastructures.
- Provided an advanced AI-powered method to save the endangered animals and intervene illegal smuggling by smartly allocating limited security resources.
- We expressed decision-making process of the attacker as a differentiable optimization layer, where the end-to-end approach can be adopted to further improve the overall performance.

Work Experience

BravoAI March 2017 - July 2017
Co-Founder *Taipei, Taiwan*

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

Mixerbox Incorporation April 2016 - March 2017
Data Scientist *Taipei, Taiwan*

- 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.

Conference Publications

- **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**, 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)

Professional Service

Neural Information Processing Systems
Subreviewer *2020*

International Joint Conference on Artificial Intelligence, AI for Social Good Workshop
Program Committee *2020*

International Conference on Autonomous Agents and Multi-Agent Systems
Subreviewer *2020*

Association for the Advancement of Artificial Intelligence
Subreviewer *2020*

International Joint Conference on Artificial Intelligence, AI for Social Good Workshop
Program Committee *2019*