Jiin Woo

Ph.D. Candidate at Carnegie Mellon University

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Education

Carnegie Mellon University (CMU) *Pittsburgh, PA, USA*

Ph.D. in Electrical & Computer Engineering *Aug. 2021 - Present*

- Advisors: Yuejie Chi and Gauri Joshi

Korea Advanced Institute of Science and Technology (KAIST) *Daejeon, South Korea*

M.S. in Electrical Engineering *Sep. 2016 - Aug. 2018*

- Advisor: Yung Yi

Korea Advanced Institute of Science and Technology (KAIST) *Daejeon, South Korea*

B.S. in Mathematical Sciences *Feb. 2011 - Aug. 2016*

Research Interests

Reinforcement Learning, Federated Learning, Statistical Inference

Selected Publications

[4] The Blessing of Heterogeneity in Federated Q-Learning: Linear Speedup and Beyond *Hawaii, USA*

Jiin Woo, Gauri Joshi, Yuejie Chi

International Conference on Machine Learning (ICML), 2023

[3] Iterative Learning of Graph Connectivity from Partially-Observed Cascade Samples *Online*

Jiin Woo, Jungseul Ok, Yung Yi

ACM MobiHoc, 2020

[2] Information Source Finding in Networks: Querying With Budgets

Jaeyoung Choi, Sangwoo Moon, Jiin Woo, KyungHwan Son, Jinwoo Shin, Yung Yi

IEEE/ACM Transactions on Networking, 2020

[1] Rumor Source Detection under Querying with Untruthful Answers *Atlanta, USA*

Jaeyoung Choi, Sangwoo Moon, Jiin Woo, KyungHwan Son, Jinwoo Shin, Yung Yi

IEEE INFOCOM, 2017

Research Experience

Yuejie Chi Group and Optimization Probability and Learning (OPAL) Lab, CMU *Aug. 2021 - Present*

Graduate Researcher (Advisors: Yuejie Chi and Gauri Joshi)

- Developed an offline federated Q-learning algorithm that prevents overestimation of Q-estimates via aggregated pessimism and guarantees linear speedup with a relaxed concentrability condition using the collective coverage of local agents.
- Developed a provably efficient federated Q-learning algorithm that leverages heterogeneity in local trajectories via weighted averaging and achieves linear speedup without requiring every agent to have full coverage of state-action space.

LeArning in Networking: Algorithm, Design, and Analysis (LANADA) Lab, KAIST *Sep. 2016 - Aug. 2018*

Graduate Researcher (Advisor: Yung Yi)

- Developed a graph inference algorithm estimating the connectivity of a graph from a collection of partially observed epidemic cascades via approximate maximum likelihood estimation, which guarantees near-optimal sample complexity.
- Improved a rumor source localization algorithm via active querying with provable guarantees and analyzed the dependency between accuracy and querying cost.
- Designed a lightweight DQN structure via parameter sharing based on the symmetricity of MDP, which significantly reduces the computational complexity while guaranteeing local optimality.

Algorithmic Intelligence Laboratory (ALIN-LAB), KAIST *Jun. 2015 - Dec. 2015*

Undergraduate Intern (Advisor: Jinwoo Shin)

- Studied the principles of graphical models. Focused on variational methods in parameter estimation.

Artificial Intelligence & Probabilistic Reasoning Laboratory (AIPR-LAB), KAIST *Jan. 2015 - May. 2015*
Undergraduate Intern (Advisor: Kee-Eung Kim)

- Studied and implemented reinforcement learning (RL) methods for competition examples. Focused on kernel-based RL.

Work Experience

NAVER Search *Seongnam, South Korea*
Machine Learning Engineer *Sep. 2018 - Aug. 2021*

- Developed a large-scale keyword representation model that identifies the intention of all queries using texts in search engine results pages (SERPs) and click logs, which covers long-tail keywords. Implemented a regularized BERT text classifier based on the co-click distance between keywords to extract fine-grained embeddings of SERPs.
- Developed a personalized keyword recommendation algorithm that considers real-time search trends and personal preferences depending on user features with contextual multi-armed bandit and Bradley-Terry model.
- Developed the embedding of user actions for various user analysis tasks, such as user satisfaction prediction and next action prediction. Contributed by developing an attention-based representation model, which encodes a sequence of search actions to a compact embedding.

Teaching Experience

Special Topics in Artificial Intelligence: Foundations of Reinforcement Learning (18-813B) *Spring 2023*
Teaching Assistant, Carnegie Mellon University (CMU)

Data Structures and Algorithms for Electrical Engineering (EE205) *Fall 2017*
Teaching Assistant, Korea Advanced Institute of Science and Technology (KAIST)

Calculus 1, 2 (MAS101, MAS102) *Fall 2016, Fall 2017*
Tutor, Korea Advanced Institute of Science and Technology (KAIST)

EE Co-op Program (Field Training and Education Program) *Spring 2017*
Teaching Assistant, Korea Advanced Institute of Science and Technology (KAIST)

Honors & Awards

Hsu Chang Memorial Fellowship *USA*
Electrical and Computer Engineering Department at Carnegie Mellon University (CMU) *2022-2023*

Carnegie Institute of Technology Dean's Fellowship *USA*
Carnegie Institute of Technology at Carnegie Mellon University (CMU) *2021-2022*

KAIST Support Scholarship *South Korea*
Korea Advanced Institute of Science and Technology (KAIST) *Fall 2016 - Spring 2018*

Excellence Award in Creative Challenge Type SW R&D Program *Seoul, South Korea*
Korea IT Business Promotion Association (IPA) *Nov. 2015*

The National Scholarship for Science and Engineering *South Korea*
Korea Student Aid Foundation (KOSAF) *Spring 2011 - Spring 2015*

Relevant Coursework

Machine Learning	Distributed and Federated Learning Algorithms, Advanced Introduction to Machine Learning, Convex Optimization, Information Theory, Fundamentals of Machine Learning
Statistics/Math	Intermediate Statistics, Mathematical Statistics, Graph Theory, Lebesgue Integral Theory, Logic and Set Theory, Analysis, Discrete Mathematics, Probability and Statistics, Linear Algebra
Programming/Systems	Operating Systems and System Programming for Electrical Engineering, System Programming, Data structure, Computer Network

Skills

Programming	Python, MATLAB, C, Java, LaTeX
ML, Data Science	Pytorch, Spark, Hive, Hadoop
Others	HTML, CSS, Javascript, MongoDB, Express, AngularJS, NodeJS

Professional Services

Reviewer	NeurIPS (2023), ICLR (2024)