Jiin Woo

Machine Learning Engineer at NAVER Corporation
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Research Interests

My primary research interest lies in optimization, statistical inference, and machine learning for graph-structured problems, specifically in learning structures and dynamics of real-life networks. In particular, I am interested in graph representation learning and combinatorial optimization problems over graphs.

Education

Korea Advanced Institute of Science and Technology (KAIST) *Daejeon, South Korea*
M.S. in Electrical Engineering *Sep. 2016 - Aug. 2018*
- Advisor: Yung Yi
- Thesis: Greedy Learning of Graph Connectivity from Partially-Observed Cascade Samples
- Committee: Yung Yi, Song Chong, Jinwoo Shin

Korea Advanced Institute of Science and Technology (KAIST) *Daejeon, South Korea*
B.S. in Mathematical Sciences *Feb. 2011 - Aug. 2016*
- Cum Laude

Linköping University *Linköping, Sweden*
Exchange Student *Feb. 2014 - Aug. 2014*

Work Experience

NAVER Data Insight Center *Seongnam, South Korea*
Machine Learning Engineer *Sep. 2018 - Present*
- 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. Reduced class spaces by clustering classes with non-negative matrix factorization.
- Developed a personalized keyword recommendation algorithm that considers real-time search trends and personal preferences depending on gender and age with contextual multi-armed bandit and Bradley-Terry model.
- Provided 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.
- Participated in the development of a search engine evaluation system. Contributed to the selection of features for high-quality indicators with XGBoost.

Publications

Conference

[C3] Iterative Learning of Graph Connectivity from Partially-Observed Cascade Samples *Online*
Jiin Woo, Jungseul Ok, Yung Yi
ACM MobiHoc, 2020

[C2] On the Asymptotic Content Routing Stretch in Network of Caches: Impact of Popularity Learning *New York, USA*
Boram Jin, **Jiin Woo**, Yung Yi
NETGCOOP, 2019

[C1] 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

Journal

[J2] 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

[J1] Estimating the Information Source under Decaying Diffusion Rates
Jiin Woo, Jaeyoung Choi
Electronics, 2019

Honors & Awards

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*

3rd place in "Show Me The Street" Innovation Challenge 2015 *Incheon, South Korea*
Cisco Global Center of Excellence (GCoE) *Nov. 2015*

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

Projects

Learning-Based Framework for Improving Large-scale Search *Jul. 2017 - Jun. 2018*
NAVER Corporation

- Developed a recommendation algorithm that daily selects a small set of keywords among a massive size of candidates to maximize user satisfaction on the search engine result pages.
- Significantly reduced the computational complexity of deep reinforcement learning by designing parameter shared Deep Q-Networks (DQN) based on the permutation equivariant and invariant properties of the problem's Markov Decision Process (MDP).
- Contributed to the MDP formulation and mathematical proofs for the local optimality of the weight shared DQN structure.

Versatile Network System Architecture for Multi-dimensional Diversity *Sep. 2016 - Dec. 2017*
Institute for Information & communications Technology Promotion (IITP) funded by the Korea government (MSIP)

- Developed FogOS, a distributed operating system for IoT services, which manages the cloud and the resources at the edge and connects individually owned edge devices with incentives in a distributed manner.
- Participated in the implementation of a matching module in FogOS, which optimizes the resource allocation between service requests and available edge devices.

Real-Time Analysis and Interactive Visualization Platform for Large-Scale IoT Data *Jun. 2015 - Nov. 2015*
Korea IT Business Promotion Association (IPA)

- Developed a web-based data visualization platform, which provides real-time information about large-scale streaming data. Applied the platform to smart city data collected from sensors, such as air pollution and energy consumption, and provided real-time urban information to citizens.
- Implemented interactive data visualization web pages with MEAN stack (MongoDB, Express.js, AngularJS, and Node.js).

Other Selected Research Experience

Algorithmic Intelligence Laboratory (ALIN-LAB), KAIST *Jun. 2015 - Dec. 2015*
Undergraduate Intern (Advisor: Jinwoo Shin)

- Studied Minimum weight perfect matching (MWPM) and maximum weight matching (MWM) problems. Focused on parallelizable algorithms for MWPM and MWM with multiple intermediate max-product belief propagations (BPs).
- 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.

Teaching

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)

Courses

CS: Computer Science, EE: Electrical Engineering, IE: Industrial & Systems Engineering, MAS: Mathematical Sciences

Machine Learning & Modeling

- [CS] Artificial Intelligence and Machine Learning A0
- [EE] Epidemics and Information Diffusion in Complex Networks A+
- [EE] Economics in Communication Networks A0
- [MAS] Fundamentals of Machine Learning A+

Theory

- [IE] Engineering Statistics 1 A0
- [IE] Engineering Statistics 2 A0
- [EE] Information Theory A0
- [MAS] Introduction to Graph Theory A-
- [MAS] Mathematical Statistics A0
- [MAS] Lebesgue Integral Theory A-
- [MAS] Introduction to Differential Geometry A0
- [MAS] Logic and Set Theory A0
- [MAS] Analysis 1 A0
- [MAS] Analysis 2 A+
- [MAS] Discrete Mathematics A0
- [MAS] Probability and Statistics A0
- [MAS] Differential Equations and Applications A-
- [MAS] Introduction to Linear Algebra A0
- [MAS] Calculus 1 A+
- [MAS] Calculus 2 A+

Programming & Systems

- [CS] System Programming A-
- [CS] Data structure A0
- [CS] Introduction to Programming A-
- [IE] Information Technology for IE A0
- [EE] Computer Network A0
- [EE] Operating Systems and System Programming for Electrical Engineering B+

Technical Skills

Programming Python, MATLAB, C, Java, LaTeX
ML · Big data Pytorch, Tensorflow, Spark, Hive, Hadoop
Others HTML, CSS, Javascript, MongoDB, Express, AngularJS, NodeJS