Sangwoong Yoon
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Research Interests

- Application of generative machine learning to out-of-distribution detection
- Nonparametric estimation of information-theoretic quantities
- Applying machine learning on problems from diverse areas, including, but not limited to, natural sciences (physics, chemistry, and meteorology) and industries (manufacturing and finance)

Education

Seoul National University Mar 2020 - Present
Ph.D. Student in Mechanical Engineering
Advisor: Prof. Frank Chongwoo Park

Seoul National University Mar 2014 - Feb 2016
M.S. in Interdisciplinary Program in Neuroscience
Advisor: Prof. Byoung-Tak Zhang (Department of Computer Science and Engineering)
Thesis: Adaptive Bayesian Optimization for Organic Material Screening

Seoul National University Mar 2008 - Feb 2013
B.S. in Chemical and Biological Engineering
Graduated *cum laude* (GPA: 3.85 / 4.3)

Gyeonggi Science High School Mar 2006 - Feb 2008
Finished one year early with the valedictory honor granted by the Gyeonggi province governor

Work Experience

Research Scientist Intern @ **Kakao Brain** (https://www.kakaobrain.com/) Oct 2019 - May 2020
- Research on scene-graph based image-to-image and text-to-image retrieval algorithms
- Research on autoencoders for out-of-distribution detection

Researcher @ **Saige Research** (http://www.saigeresearch.ai/) Mar 2019 - Sep 2019
- Research on deep learning algorithms for classification, segmentation, and unsupervised anomaly detection applied in optical surface defect inspection
- Develop a web-based internal leader board system which automatically evaluates submitted prediction results using Django, Vue.js, and Jenkins

Researcher @ **Robotics Lab, Seoul National University** (http://robotics.snu.ac.kr/fcp/) Aug 2018 - Mar 2019
- Research on nonparametric information estimation Prof. Yung-Kyun Noh and Prof. Frank C. Park

Machine learning team lead @ **Haezoom Inc.** (https://www.haezoom.com/) Jan 2016 - July 2018
- Lead a team of five to develop machine learning solutions for solar power plants
- Develop a data processing pipeline system which continuously processes data from weather stations, satellites, numerical weather forecasters, and solar power plants
- Develop fault detection system for solar power plants and solar power generation forecasting system
- Develop future cloud movement prediction algorithm based on 3D convolutional neural networks

Publications

1. **Sangwoong Yoon**, Frank C. Park, and Yung-Kyun Noh. **Kullback-Leibler Divergence Estimation using Variationally Weighted Kernel Density Estimators**, *Neural Information Processing Systems 2019 Information Theory and Machine Learning Workshop*, 2019.

2. SooKyung Kim, Hyojin Kim, Joonseok Lee, **Sangwoong Yoon**, Samira E. Kahou, Karthik Kashinath, Mr Prabhat. **Deep Hurricane-Tracker: Tracking and Forecasting Extreme Climate Events**, *IEEE Winter Conference on Applications of Computer Vision*, 2019.

3. **Sangwoong Yoon**, Yonho Song, Minsoo Kim, Frank C. Park and Yung-Kyun Noh. **Interpretable Feature Selection Using Local Information for Credit Assessment**. *Neural Information Processing Systems 2018 Workshop on Challenges and Opportunities for AI in Financial Services*, 2018 (Oral).

4. **Sangwoong Yoon**, Sang-Woo Lee, and Byoung-Tak Zhang, **Predictive Property of Hidden Representations in Recurrent Neural Network Language Models**, *Neural Information Processing Workshop Systems 2014 Workshop on Modern Machine Learning Methods and Natural Language Processing*, 2014.

Patents

1. Oh-Hyun Kwon, Jung-Seok Hyung and **Sangwoong Yoon**, **Method, Server, and System for Detecting Abnormality of a Power Plant using Solar Energy**, the Republic of Korea patent, KR101775065B1, applied in Aug 5, 2016, granted in Sep 6, 2017.
2. Oh-Hyun Kwon, Jung-Seok Hyung and **Sangwoong Yoon**, **Method and Server for Forecasting Generation of a Power Plant using Solar Energy**, the Republic of Korea patent, KR101808047B1, applied in Aug 5, 2016, granted in Dec 14, 2017.

Professional Services

Services for Academic Communities

- Served as a reviewer in NeurIPS 2019, NeurIPS 2018, ICML 2019, AISTATS 2018, ACML 2019, and ACML 2018
- Volunteered as a website admin for the second Korea-Japan Machine Learning Workshop[1]

Services for Developer Communities

- Submitted 5 merged pull requests to Pandas[2]: #17253, #19427, #22380, #26157, #26158
- Volunteered as a staff in PYCON KR 2015 and PYCON APAC 2017

Talks

- Fastcampus Alumni Seminar, "Interpretable Machine Learning", 2019
- Fastcampus Deep Learning Algorithm Workshop "Variational Autoencoders", 2018
- PYCON KR 2017, "Forecasting weather using Python and TensorFlow"[3]

Awards

- Best poster presentation award (gold prize, the first place) at THE AI KOREA 2019
  Poster title: Kullback-Leibler Divergence Estimation using Variationally Weighted Kernel Density Estimators
- Four-year full tuition scholarship granted by Korea Student Aid Foundation (2008 - 2012).

Skills

- **Languages**: Korean (native), English (TOEFL: 107/120 (2019.8.4), TEPS 852/990 (2015.8.22))
- **Programming Languages**: Expert in Python, competent in MATLAB, SQL, Bash, JavaScript, and some knowledge of C, C++, Java, CUDA
- **Tools**: Git, PyTorch, TensorFlow, Django, Jenkins, Linux/Ubuntu, Docker, Vim, CuPy, OpenCV, Keras, PostgreSQL, PostGIS, HDF5, Vue.js

[1] http://aisociety.kr/KJMLW2019/
[2] https://github.com/pandas-dev/pandas
[3] https://www.pycon.kr/2017/program/179