Sangwoong Yoon

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RESEARCH INTERESTS

- Deep generative models, particularly energy-based models.
- Epistemic uncertainty quantification problems, e.g., out-of-distribution detection and active learning.
- Application of machine learning on robotics and natural sciences.

EDUCATION

Seoul National University *Ph.D. in Mechanical Engineering*   Mar 2020 - Aug 2023
  Advisor: Frank Chongwoo Park
  Thesis: Energy-Based Probabilistic Models for Epistemic Uncertainty Quantification

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

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

Gyeonggi Science High School   Mar 2006 - Feb 2008
  The valedictory honor granted by the Gyeonggi province governor
  One-year early graduation

WORK EXPERIENCE

AI Research Fellow @ **Korea Institute for Advanced Study (KIAS)**   Sep 2023 - Present

Applied scientist intern @ **Amazon.com** Search Science and AI   Jun 2022 - Sep 2022
  - Research on incorporating uncertainty information into a large-scale language model
    to improve click-through rate prediction. Received "inclined to hire" evaluation.

Research scientist intern @ **Kakao Brain** (https://www.kakaobrain.com/)   Oct 2019 - May 2020
A research-oriented affiliate of Kakao Crop., No.1 messenger app provider in Korea.
  - Research on scene-graph based image-to-image and text-to-image retrieval algorithms.

Researcher @ **Saige Research** (http://www.saigeresearch.ai/)   Mar 2019 - Sep 2019
A start-up providing deep learning-based anomaly detection solutions for manufacturers.
  - Research on deep learning algorithms for optical surface defect inspection.

Machine learning team lead @ **Haezoom Inc.** (https://www.haezoom.com/)   Jan 2016 - July 2018
A start-up providing machine learning solutions for solar power plants.
  - Lead a team of five to develop real-time data pipeline, fault detection algorithm,
    and forecasting system for solar power plants.

AWARDS

- Outstanding Doctoral Dissertation Award (Aug 2023)
- Qualcomm Innovation Fellowship Korea 2021 (Sep 2021) <u>link</u>
- Youlchon AI Stars Scholarship 2021 (Aug 2021) <u>link</u>
- Best Poster Award and Most Popular Poster Award at Machine Learning Summer School 2021 (Aug 2021)
- Four-year full tuition scholarship granted by Korea Student Aid Foundation (2008 - 2012)

PUBLICATIONS

Journal

1. Howon Jin*, **Sangwoong Yoon***, Frank C. Park, and Kyung Hyun Ahn. **Data-driven constitutive model of complex fluids using recurrent neural networks**, *Rheologica Acta*, 2023.

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  *Equal contribution

2. Minwoo Lee*, **Sangwoong Yoon***, Juhan Kim, Yuangang Wang, Keeman Lee, Frank Chongwoo Park, Chae Hoon Sohn. **Classification of Impinging Jet Flames Using Convolutional Neural Network with Transfer Learning**, *Journal of Mechanical Science and Technology*, 2022. link

3. Kyu Min Park, Younghyo Park, **Sangwoong Yoon**, and Frank C. Park. **Collision Detection for Robot Manipulators Using Unsupervised Anomaly Detection Algorithms**, *IEEE Transactions on Mechatronics*, 2021. link

Conference

1. **Sangwoong Yoon**, Young-Uk Jin, Yung-Kyun Noh, and Frank C. Park. **Energy-Based Models for Anomaly Detection: A Manifold Diffusion Recovery Approach**, *Neural Information Processing Systems (NeurIPS)*, 2023

2. **Sangwoong Yoon**, Frank C. Park, Gunsu S. Yun, Iljung Kim, and Yung-Kyun Noh. **Variational Weighting for Kernel Density Ratios**, *Neural Information Processing Systems (NeurIPS)*, 2023

3. Yonghyeon Lee, **Sangwoong Yoon**, Minjun Son, and Frank C. Park. **Regularized Autoencoders for Isometric Representation Learning**, *Proceedings of International Conference on Learning Representations (ICLR)*, 2022. link

4. **Sangwoong Yoon**, Yung-Kyun Noh, and Frank C. Park. **Autoencoding Under Normalization Constraints**, *Proceedings of the 38th International Conference on Machine Learning (ICML)*, 2021. link

5. **Sangwoong Yoon**, Woo Young Kang, Sungwook Jeon, SeongEun Lee, Changjin Han, Jonghun Park, and Eun-Sol Kim. **Image-to-Image Retrieval by Learning Similarity between Scene Graphs**, *Proceedings of the 35th AAAI Conference on Artificial Intelligence (AAAI)*, 2021. link

6. 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 (WACV)*, 2019.

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, ICML, ICLR, AAAI, AISTATS, and ACML
- Volunteered as a website admin for the second Korea-Japan Machine Learning Workshop

Services for Developer Communities
- Submitted 5 merged pull requests to Pandas: #17253, #19427, #22380, #26157, #26158
- Volunteered as a staff in PYCON KR 2015 and PYCON APAC 2017

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