Namuk Park

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Research Summary

My research has focused on elucidating the underlying nature of deep neural networks and, more importantly, applying it to real-world problems. In particular, I am interested in (1) probabilistic neural networks, (2) generalization and trustworthy machine learning, and (3) exploratory analysis.

Education

Yonsei University, Incheon, South Korea Mar 2011 – Feb 2022
M.S. and Ph.D. in School of Integrated Technology (Computer Science)
▹ Thesis: "Practical Bayesian Neural Networks: A Data Uncertainty Perspective"
▹ Advisor: Prof. Songkuk Kim

Yonsei University, Seoul, South Korea Mar 2008 – Feb 2011
B.S. in Physics
▹ *GPA: 4.18/4.30.*, Valedictorian of the College of Sciences & 1 year early graduation based on academic excellence.

Daejeon Science High School, Daejeon, South Korea Mar 2006 – Feb 2008
▹ Daejeon Science High School is for gifted students with talents in mathematics and sciences.
▹ 1 year early graduation based on academic excellence.

Publications

[3] Namuk Park and Songkuk Kim. ***"How Do Vision Transformers Work?"*** ICLR 2022. ***Spotlight.***
▹ We show that the success of *"multi-head self-attention"* (MSA) is *NOT* from capturing long-range dependency, but from spatially smoothing feature maps (c.f. [2]). In particular, we demonstrate that (1) MSAs flatten the loss landscapes, (2) MSAs are low-pass filters as opposed to Convs, and (3) MSAs at the end of a stage significantly improve the accuracy.

[2] Namuk Park and Songkuk Kim. ***"Blurs Behave Like Ensembles: Spatial Smoothings to Improve Accuracy, Uncertainty, and Robustness."***, 2021. Under review. ***Winner of Qualcomm Innovative Fellowship South Korea.***
▹ We show that *"spatial smoothing"* (a simple blur filter) improves accuracy, uncertainty, and robustness of CNNs simultaneously. Such improvement is primarily attributable to flattening loss landscapes by *"spatially ensembling"* neighboring proximate feature maps of CNNs (c.f. [1]).

[1] Namuk Park, Taekyu Lee, and Songkuk Kim. ***"Vector Quantized Bayesian Neural Network Inference for Data Streams."*** AAAI 2021.
▹ We show that *"temporal smoothing"* (moving average of recent predictions) significantly improves the computational performance of Bayesian NN inference without loss of accuracy. To do so, we propose *"ensembles for proximate data points"* as an alternative to ensembles for *a single data point.*

Awards & Honors

Winner of Qualcomm Innovative Fellowship South Korea (Qualcomm) Nov 2021
Research Grant Support for Ph.D. Students (National Research Foundation of

South Korea) Jun 2021 - Feb 2022

National Fellowship from Global Open Source Frontier (NIPA[1]) Jun 2019 – Dec 2020

China–Japan–South Korea OSS Award (The Organizing Committee of the CJK OSS Award) Nov 2019

OSS Competition, Honorable Mention (NAVER Corporation) Feb 2019

OSS Challenge, First prize—the Award From the Minister of Science and ICT Nov 2018

OSS Competition (2^{nd} phase), First prize (NAVER Corporation) Aug 2018

OSS Competition (1^{st} phase), Second prize (NAVER Corporation) Feb 2018

National Ph.D. Full Ride Fellowship (Institute for Information and Communications Technology Promotion of South Korea) Mar 2011 – Feb 2016

Yonsei University Alumni Full Ride Scholarship, GE Scholarship, National Scholarship for Science and Engineering, and other merit-based scholarships Sep 2008 – Feb 2011

Talks

"How Do Vision Transformers Work?"

- AI Seminar at UNIST Mar 2022
- Tech talk at NAVER WEBTOON Jan 2022
- NAVER Tech Talk at NAVER Corporation Dec 2021

"Uncertainty in AI: Deep Learning Is Not Good Enough for Safe AI"

- Keras Korea Meetup at AI Yangjae Hub Dec 2019
- OSS Contribution Festival at NIPA Dec 2019
- South Korea-Uzbekistan SW Technology Seminar at NIPA & Tashkent University of Information Technologies Oct 2019

"A Fast and Lightweight Probability Tool for AI in Scala"

- North-East Asia OSS Forum at NIPA Nov 2019
- OSS Day (Keynote) at NIPA Nov 2018
- Scala Night Korea at Scala User Group Korea Apr 2018

Industry Experience

NAVER, Seongnam, South Korea Feb 2022 – Present

Visiting Researcher at NAVER AI Lab

- We focus on conducting fundamental machine learning research and contributing to NAVER and AI communities.

Probe Technology, Seoul, South Korea Mar 2013 – Feb 2018

Co-founder and CEO

- We provided enterprise resource planning & data analysis tool for small businesses.

Skills

PyTorch, TensorFlow, Python, Scala (Functional Programming)

[1] National IT Industry Promotion Agency of South Korea