

Namuk Park

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Email: namuk.park@gmail.com

GitHub: xxxnell

Homepage: namukpark.com

RESEARCH SUMMARY

The focus of my research has been on understanding how deep neural networks work, and why they work that way, in order to build a more generalizable machine learning system. In particular, my research covered the following topics: (i) empirical analysis of **Vision Transformers**, (ii) ensemble method, and (iii) trustworthy machine learning. Recently, I have been interested in (iv) **representation learning** and (v) multimodal Transformer.

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 [\[mail\]](#)

Yonsei University[\[wiki\]](#), 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[\[wiki\]](#), Daejeon, South Korea Mar 2006 – Feb 2008
‣ 1 year early graduation based on academic excellence.

PUBLICATIONS

[3] [Namuk Park](#) and Songkuk Kim. “**How Do Vision Transformers Work?**” ICLR 2022. **Spotlight**. [arXiv](#), [code](#).

‣ We show that the success of “*multi-head self-attentions*” (MSAs) lies in the “*spatial smoothing*” of feature maps, *not* in the capturing of long-range dependencies. In particular, we demonstrate that MSAs (i) flatten the loss landscapes, (ii) are low-pass filters, contrary to Convs, and (iii) significantly improve accuracy when positioned at the end of a stage. See also [2].

[2] [Namuk Park](#) and Songkuk Kim. “**Blurs Behave Like Ensembles: Spatial Smoothings to Improve Accuracy, Uncertainty, and Robustness.**”, ICML 2022. **Winner of Qualcomm Innovative Fellowship South Korea**. [arXiv](#), [code](#).

‣ We show that “*spatial smoothing*” (a simple blur filter) improves the accuracy, uncertainty, and robustness of CNNs, all at the same time. This is primarily due to that spatial smoothing flattens the loss landscapes by “*spatially ensembling*” neighboring feature maps of CNNs. See also [1].

[1] [Namuk Park](#), Taekyu Lee, and Songkuk Kim. “**Vector Quantized Bayesian Neural Network Inference for Data Streams.**” AAAI 2021. [arXiv](#), [code](#).

‣ 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

Outstanding Thesis Award, Third prize (Yonsei University) Jun 2022
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
INVITED 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 organized by NIPA	Dec 2019
	‣ South Korea-Uzbekistan SW Technology Seminar at Tashkent University of Information Technologies	Oct 2019
	“A Fast and Lightweight Probability Tool for AI in Scala”	
	‣ North-East Asia OSS Forum organized by NIPA	Nov 2019
	‣ OSS Day (Keynote) organized by NIPA	Nov 2018
	‣ Scala Night Korea organized by 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 (Research topic: representation learning, working with Wonjae Kim and Sangdoon Yun).	
	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	

¹National IT Industry Promotion Agency, an IT industry promotion organization operated by the Government of South Korea