

Namuk Park

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RESEARCH SUMMARY

My research has focused on elucidating the underlying natures of deep neural networks and applying them to real-world problems. More specifically, I am interested in Bayesian neural networks, ensemble methods, uncertainty estimation, robustness, generalization, loss landscapes, and scalable algorithms.

EDUCATION

Yonsei University, Incheon, Korea Mar 2011 – Feb 2022 (Expected)
M.S. and Ph.D. in School of Integrated Technology (Computer Science)
‣ Thesis: Practical Bayesian Neural Networks
‣ Advisor: Prof. Songkuk Kim

Yonsei University, Seoul, 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, 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?*”, 2021. Under review. git.io/JDq4y.

‣ We show that the success of *multi-head self-attention* (MSA) is *not* from capturing long-range dependency, but from spatially ensembling feature maps. In particular, we demonstrated 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. git.io/JDqC0.

‣ 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 feature maps of CNNs.

[1] Namuk Park, Taekyu Lee, and Songkuk Kim. “*Vector Quantized Bayesian Neural Network Inference for Data Streams.*” In 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

Qualcomm Innovative Fellowship South Korea Winner (Qualcomm) Nov 2021
Research Grant Support for Ph.D Students (National Research Foundation of Korea) Jun 2021 - Feb 2022
National Fellowship from Global Open Source Frontier Jun 2019 – Dec 2020

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| CJK 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. Fellowship from Ministry of Science and ICT | Mar 2011 – Feb 2016 |
| Yonsei University Alumni Scholarship, GE Scholarship, National Scholarship for Science and Engineering, and other merit-based scholarships | Sep 2008 – Feb 2011 |

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| INDUSTRY | Probe Technology , Seoul, Korea | Mar 2013 – Feb 2018 |
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| EXPERIENCE | Co-founder and CEO | |
| | ▸ We provided enterprise resource planning & data analysis tool for small businesses. | |

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| SKILLS | PyTorch, TensorFlow, Python, Scala (Functional Programming) |
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