Dr. Jaehong Yoon

CONTACT INFORMATION	KAIST, South Korea E-MAIL: jaehong.yoon@kaist.ac.kr LINKS: HOMEPAGE, GOOGLE SCHOLAR, TWITTER

RESEARCH INTERESTS

My research interest mainly focuses on developing lifelong-evolving and meta-cognitive algorithms for deploying on-device artificial general intelligence systems. In particular, I've been focusing on tackling practical and real-world challenges in various application domains, such as online/streaming learning, egocentric videos, and audio-video multimodal problems. I currently focus on the following topics:

- Online Continual Learning: Lifelong Learning, Video Streaming Learning
- On-device Learning: Federated Learning, Neural Network Compression
- Egocentric Vision: Video Representation Learning, Audio-video Multimodal Learning
- Learning with Real-world Data: Un-/Semi-supervised Learning, Coreset Selection

EDUCATION

KAIST, Daejeon, South Korea

Ph.D., School of Computing,   Aug 2018 - Feb 2023
- Thesis: *"On-device, Online Continual Learning for the Real World"*
- The Best Ph.D. Dissertation Award from KAIST College of Engineering
- The Best Ph.D. Dissertation Award from KAIST School of Computing
- Machine Learning and Artificial Intelligence (MLAI) Lab
- Adviser: Prof. Sung Ju Hwang
- Area of Study: Machine Learning

UNIST, Ulsan, South Korea

M.S., Computer Science,   Aug 2016 - Feb 2018
- Thesis: *"Combined Group and Exclusive Sparsity for Deep Neural Networks"*
- Adviser: Prof. Sung Ju Hwang
- Area of Study: Machine Learning

B.S., Computer Science Engineering,   Mar 2012 - Aug 2016
- Biological Science Minor

RESEARCH EXPERIENCE

Postdoctoral Research Associate,   UNC Chapel-Hill, US   **08/2023 - Current**
     Supervisor: Prof. Mohit Bansal

Postdoctoral Research Associate,   KAIST, South Korea   **03/2023 - 08/2023**
     Supervisor: Prof. Sung Ju Hwang

Visiting Student,   Weizmann Institute of Science, Israel   10/2022 - 11/2022
     Host: Prof. Yonina Eldar

Research Intern,   Microsoft Research, China   11/2021 - 04/2022
     Visual Computing Group
     Mentor: Dr. Yue Cao

Research Assistant,   MLAI Lab., KAIST, South Korea   02/2018 - 08/2018

Research Intern,   AITRICS, South Korea   03/2018 - 05/2018

*: equal contribution

[C12] *Continual Learners are Incremental Model Generalizers*
Jaehong Yoon, Sung Ju Hwang, Yue Cao
International Conference on Machine Learning **(ICML) 2023**, Hawaii, USA

[C11] *Personalized Subgraph Federated Learning*
Jinheon Baek*, Wonyong Jeong*, Jiongdao Jin, Jaehong Yoon, and Sung Ju Hwang
International Conference on Machine Learning **(ICML) 2023**, Hawaii, USA

[C10] *On the Soft-Subnetwork for Few-shot Class Incremental Learning*
Haeyong Kang, Jaehong Yoon, Sultan Madjid, Sung Ju Hwang, Chang D. Yoo
International Conference on Learning Representations **(ICLR) 2023**, Kigali, Rwanda

[C9] *Bitwidth Heterogeneous Federated Learning with Progressive Weight Dequantization*
Jaehong Yoon*, Geon Park*, Wonyong Jeong, and Sung Ju Hwang
International Conference on Machine Learning **(ICML) 2022**, Baltimore, USA

[C8] *Forget-free Continual Learning with Winning Subnetworks*
Haeyong Kang*, Rusty Mina*, Sultan Madjid, Jaehong Yoon, Mark Hasegawa-Johnson, Sung Ju Hwang, and Chang D. Yoo
International Conference on Machine Learning **(ICML) 2022**, Baltimore, USA

[C7] *Rethinking the Representational Continuity: Towards Unsupervised Continual Learning*
Divyam Madaan, Jaehong Yoon, Yuanchun Li, Yunxin Liu, and Sung Ju Hwang
International Conference on Learning Representations **(ICLR) 2022**, Virtual
Oral Presentation (Acceptance Rate = 54/3391 = 1.6%)

[C6] *Online Coreset Selection for Rehearsal-based Continual Learning*
Jaehong Yoon, Divyam Madaan, Eunho Yang, and Sung Ju Hwang
International Conference on Learning Representations **(ICLR) 2022**, Virtual

[C5] *Federated Continual Learning with Weighted Inter-client Transfer*
Jaehong Yoon*, Wonyong Jeong*, Giwoong Lee, Eunho Yang, and Sung Ju Hwang
Lifelong Machine Learning Workshop @ ICML 2020
International Conference on Machine Learning **(ICML) 2021**, Virtual

[C4] *Federated Semi-supervised Learning with Inter-Client Consistency & Disjoint Learning*
Wonyong Jeong, Jaehong Yoon, Eunho Yang, and Sung Ju Hwang
Federated Learning for User Privacy and Data Confidentiality Workshop @ ICML 2020, **Long Presentation**, **Best Student Paper Award**
International Conference on Learning Representations **(ICLR) 2021**, Virtual

[C3] *Scalable and Order-robust Continual Learning with Additive Parameter Decomposition*
Jaehong Yoon, Saehoon Kim, Eunho Yang, and Sung Ju Hwang
International Conference on Learning Representations **(ICLR) 2020**, Addis ababa, Ethiopia, Virtual

[C2] *Lifelong Learning with Dynamically Expandable Networks*
Jaehong Yoon, Eunho Yang, Jeongtae Lee, and Sung Ju Hwang
International Conference on Learning Representations **(ICLR) 2018**, Vancouver, Canada

[C1] *Combined Group and Exclusive Sparsity for Deep Neural Networks*
Jaehong Yoon and Sung Ju Hwang
International Conference on Machine Learning **(ICML) 2017**, Sydney, Australia

PREPRINTS

[P6] *Progressive Neural Representation for Sequential Video Compilation*
Haeyong Kang, Dahyun Kim, Jaehong Yoon, Sung Ju Hwang, Chang D. Yoo
Under review, 2023.

[P5] *Forget-free Continual Learning with Soft-Winning SubNetworks*
Haeyong Kang, Jaehong Yoon, Sultan Madjid, Sung Ju Hwang, Chang D. Yoo
Under review, 2023.

[P4] *Text-Guided Token Selection for Text-to-Image Synthesis with Token-based Diffusion Models*
Jaewoong Lee*, Sangwon Jang*, Jaehyeong Jo, Jaehong Yoon, Yunji Kim, Jin-Hwa Kim, Jung-Woo Ha, Sung Ju Hwang
Under review, 2023.

[P3] *Efficient Video Representation Learning via Motion-Aware Token Selection*
Sunil Hwang*, Jaehong Yoon*, Youngwan Lee*, Sung Ju Hwang
Under review, arXiv:2211.10636, 2022.

[P2] *Rapid Structural Pruning of Neural Networks with Set-based Task-Adaptive Meta-Pruning*
Minyoung Song, Jaehong Yoon, Eunho Yang, and Sung Ju Hwang
arXiv:2006.12139, 2020.

[P1] *Adaptive Network Sparsification with Dependent Beta-Bernoulli Dropout*
Juho Lee, Saehoon Kim, Jaehong Yoon, Haebeom Lee, Eunho Yang, and Sung Ju Hwang
arXiv:1805.10896, 2018.

WORKSHOP PRESENTATIONS

[W1] *BiTAT: Neural Network Binarization with Task-dependent Aggregated Transformation*
Geon Park*, Jaehong Yoon*, Haiyang Zhang, Xing Zhang, Sung Ju Hwang, and Yonina C. Eldar
Computational Aspects of Deep Learning (CADL) Workshop @ ECCV 2022

PATENTS (US ONLY)

Method and Apparatus with Neural Network and Training
Jaehong Yoon, Saehoon Kim, Eunho Yang, and Sung Ju Hwang
US 20210256374 A1, Aug 2021

Electronic Apparatus and Method for Re-learning Trained Model
Jaehong Yoon, Eunho Yang, Jeongtae Lee, and Sung Ju Hwang
US 20180357539 A1, Dec 2018

RESEARCH PROJECTS

Center for Applied Research in Artificial Intelligence (CARAI)

funded by ADD (Agency for Defense Development)   Dec 2019 - Dec 2025

Conducted research on tackling noisy and redundant data problems from video stream data for training deep learning algorithms on embedded devices.

Large-Scale Distributed Deep Learning − Neural Research Processing Center

funded by Samsung Electronics   Dec 2020 - Dec 2022

Conducted research on federated learning algorithms where participating local devices have heterogeneous hardware bit-witdh specifications.

Learning on the Edge: On-device Real-world Continual Learning

funded by Microsoft Research Asia   May 2021 - Apr 2022

Conducted research on practical unsupervised continual representation learning algorithms for real-world data where the arriving data stream is barely labeled.

Petaflop-Scale Machine Learning Framework – Next Generation High-Performance Computing

funded by National Research Foundation   Nov 2016 - Jul 2021

Conducted research on deploying compact/sparse neural networks for high-performance computing via neural pruning and weight quantization.

Specialized Deep Learning Models for Automated Inspection Processes

funded by LG CNS   Apr 2020 - Dec 2020

Conducted research on automatic/rapid search of sparsified neural networks for target task problems via set-based meta neural pruning.

Efficient Large-Scale Deep Learning – Neural Research Processing Center

funded by Samsung Electronics   Nov 2017 - Oct 2020

Conducted research on practical federated learning algorithms where each local client trains on non-stationary tasks continually during federated learning, or a server/client has a large amount of unlabeled data for training.

Human-Inspired Large Scale Visual Recognition System

funded by Samsung Electronics   Dec 2015 - Jan 2020

Conducted research on the training of task-adaptive dynamic neural networks on a sequence of visual recognition tasks.

Simultaneous Object/Scene Recognition and Learning from Driving Videos

funded by Hyundai Motor Company   Dec 2015 - May 2016

Conducted research on simultaneous object/scene recognition and learning from driving videos.

REVIEWER SERVICES	INTERNATIONAL CONFERENCES

2022 − 2023 Conference on Lifelong Learning Agents (CoLLAs)
2019 − 2023 International Conference on Machine Learning (ICML)
2019 − 2023 International Conference on Learning Representations (ICLR)
2018 − 2023 Neural Information Processing System (NeurIPS)
2020 International Joint Conferences on Artificial Intelligence (IJCAI)
2020 Association for the Advancement of Artificial Intelligence (AAAI)

INTERNATIONAL JOURNALS

2022 Journal of Artificial Intelligence Research (JAIR)
2020, 2022 IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
2021 IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
2021 IEEE/ACM Transactions on Networking (ToN)
2020 Neural Networks

AWARDS

The Best Ph.D. Dissertation Award from KAIST College of Engineering, 2023

The Best Ph.D. Dissertation Award from KAIST School of Computing, 2023

NeurIPS Top Reviewers Award, 2019

NAVER Ph.D. Fellowship Award, 2017

INVITED TALKS

Towards Continuously Evolving AI

Edinburgh University, 2023

Federated and Continual Learning with Heterogeneous Clients

Prof. Eric Xing's Group, CMU & MBZUAI, 2023

Online Coreset Selection for Rehearsal-based Conitnual Learning

Prof. Kristin Grauman's Group, UT Austin, 2022

Representational Continuity for Unsupervised Continual Learning

Korea Computer Congress (KCC), 2022

Lifelong Learning with Dynamically Expandable Networks

Samsung SDS, 2019
Tech. Talk from NAVER Corp., 2018
Tech. Open Connect (T-T.O.C) from SK-Telecom, 2018

Combined Group and Exclusive Sparsity for Deep Neural Networks

Korea Software Congress (KSC), 2017

REFERENCES **Prof. Mohit Bansal**, Professor, University of North Carolina (UNC) Chapel Hill, US
Email: mbansal@cs.unc.edu

Prof. Sung Ju Hwang, Associate Professor, KAIST
Email: sjhwang82@kaist.ac.kr

Prof. Eunho Yang, Associate Professor, KAIST
Email: eunhoy@kaist.ac.kr

Dr. Yue Cao, Senior Researcher, Mircosoft Research Asia
Email: caoyue10@gmail.com

Prof. Yonina Eldar, Professor, Weizmann Institute of Science, Israel
Email: yonina.eldar@weizmann.ac.il