Jaehong Yoon

Contact Information

KAIST, South Korea
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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. student, 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
- 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

Weizmann Institute of Science, Rehovot, Israel

Visiting Student Oct 2022 - Nov 2022

- Host: Prof. Yonina Eldar

Microsoft Research, Beijing, China

Research Internship Nov 2021 - Apr 2022

- Visual Computing Group
- Mentor: Dr. Yue Cao

MLAI Lab., KAIST, Daejeon, South Korea

Contract Research Scientist Feb 2018 - Aug 2018

AITRICS, Seoul, South Korea

Research Internship Mar 2018 - May 2018

Conference Publications

*: equal contribution

[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
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
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] ***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.

[P5] ***Continual Learners are Incremental Model Generalizers***
Jaehong Yoon, Sung Ju Hwang, Yue Cao
Under review, 2023.

[P4] ***Efficient Video Representation Learning via Masked Video Modeling with Motion-centric Token Selection***
Sunil Hwang*, **Jaehong Yoon***, Youngwan Lee, Sung Ju Hwang
Under review, arXiv:2211.10636, 2022.

[P3] ***Personalized Subgraph Federated Learning***
Jinheon Baek*, Wonyong Jeong*, Jiongdao Jin, **Jaehong Yoon**, and Sung Ju Hwang
Under review, arXiv:2206.10206, 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

[W3] ***BiTAT: Neural Network Binarization with Task-dependent Aggregated Transformation***
Geon Park*, **Jaehong Yoon***, Haiyang Zhang, Xing Zhang, Sung Ju Hwang, and Yonina C. Eldar
ECCV Workshop on Computational Aspects of Deep Learning (CADL), ECCV 2022

[W2] ***Federated Semi-supervised Learning with Inter-client Consistency***
Wonyong Jeong, **Jaehong Yoon**, Eunho Yang, and Sung Ju Hwang
ICML Workshop on Federated Learning for User Privacy and Data Confidentiality, ICML 2020, **Long Presentation**, **Best Student Paper Award**

[W1] ***Federated Continual Learning with Weighted Inter-client Transfer***
Jaehong Yoon*, Wonyong Jeong*, Giwoong Lee, Eunho Yang, and Sung Ju Hwang
ICML Workshop on Lifelong Machine Learning, ICML 2020

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 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 automatically/rapidly search of sparsified neural networks for target task problem 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/clients have 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 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 *Conference on Lifelong Learning Agents* (CoLLAs)
- 2019 – 2022 *International Conference on Machine Learning* (ICML)
- 2019 – 2023 *International Conference on Learning Representations* (ICLR)
- 2018 – 2022 *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

NAVER Ph.D. Fellowship Award, 2017

Invited Talks

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

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

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

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