Dr. Jaehong Yoon

Contact Information

University of North Carolina, Chapel Hill, NC
E-mail: jhyoon@cs.unc.edu
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

Research Experience

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

Postdoctoral Research Associate, KAIST, South Korea 03/2023 - 08/2023
Advisor: 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 Scientist, MLAI Lab., KAIST, South Korea 02/2018 - 08/2018

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

Conference Publications

*: equal contribution

[C16] ***ECoFLaP: Efficient Coarse-to-Fine Layer-Wise Pruning for Vision-Language Models***
Yi-lin Sung, **Jaehong Yoon**, and Mohit Bansal
International Conference on Learning Representations **(ICLR) 2024**, Vienna, Austria

[C15] ***Analyzing and Mitigating Object Hallucination in Large Vision-Language Models***
Yiyang Zhou*, Chenhang Cui*, **Jaehong Yoon**, Linjun Zhang, Chelsea Finn, Mohit Bansal, and Huaxiu Yao
NeurIPS 2023 Workshop on Instruction Tuning and Instruction Following
International Conference on Learning Representations **(ICLR) 2024**, Vienna, Austria

[C14] ***Progressive Fourier Neural Representation for Sequential Video Compilation***
Haeyong Kang, **Jaehong Yoon**, Dahyun Kim, Sung Ju Hwang, and Chang D. Yoo
International Conference on Learning Representations **(ICLR) 2024**, Vienna, Austria

[C13] ***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
International Conference on Computer Vision **(ICCV) 2023**, Paris, France

[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

[P7] ***CREMA: Multimodal Compositional Video Reasoning via Efficient Modular Adaptation and Fusion***
Shoubin Yu*, **Jaehong Yoon***, and Mohit Bansal
arXiv:2402.05889, 2024.

[P6] ***Mementos: A Comprehensive Benchmark for Multimodal Large Language Model Reasoning over Image Sequences***
Xiyao Wang, Yuhang Zhou, Xiaoyu Liu, Hongjin Lu, Yuancheng Xu, Feihong He, **Jaehong Yoon**, Taixi Lu, Gedas Bertasius, Mohit Bansal, Huaxiu Yao, and Furong Huang
arXiv:2401.10529, 2024.

[P5] ***Multimodal Representation Learning by Alternating Unimodal Adaptation***
XiaoHui Zhang, **Jaehong Yoon**, Mohit Bansal, and Huaxiu Yao
arXiv:2311.10707, 2023.

[P4] ***Lifelong Audio-video Masked Autoencoder with Forget-robust Localized Alignments***
Jaewoo Lee*, **Jaehong Yoon***, Wonjae Kim, Yunji Kim, and Sung Ju Hwang
arXiv:2310.08204, 2023.

[P3] ***EVEREST: Efficient Masked Video Autoencoder by Removing Redundant Spatiotemporal Tokens***
Sunil Hwang*, **Jaehong Yoon***, Youngwan Lee*, and Sung Ju Hwang
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

[W2] ***Carpe Diem: On the Evaluation of World Knowledge in Lifelong Language Models***
Yujin Lee, **Jaehong Yoon**, Seonghyeon Ye, Sung Ju Hwang, and Se Young Yun
NeurIPS 2023 Workshop on Synthetic Data Generation with Generative AI, **Oral Presentation**

[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
ECCV 2022 Workshop on Computational Aspects of Deep Learning (CADL)

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 - Aug 2023

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 – 2024 *Conference on Lifelong Learning Agents* (CoLLAs)
2019 – 2024 *International Conference on Machine Learning* (ICML)
2019 – 2024 *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, 2023 *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

NeurIPS Top Reviewers Award, 2019

NAVER Ph.D. Fellowship Award, 2017

Invited Talks

Lightweight Video & Multimodal Learning

LG AI, 2023

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, South Korea
Email: sjhwang82@kaist.ac.kr

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

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

Prof. Yonina Eldar, Professor, Weizmann Institute of Science, Israel
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