LONGHUI YU

PhD Applicant

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"Focus on some problems which are really practical and valuable."

Research Interests

My research mainly focuses on reliable and efficient machine learning against distributions shifts, especially for the label distribution shifts. To explore a robust machine learning model, I have conducted several projects on Continual Learning, Long-tailed Learning, Semi-supervised Learning, Neural Collapse, and Out-of-Distribution Detection. Meanwhile, I also pay attention to the practical application of deep learning. I have conducted research on Autonomous Driving, Object Detection, Cross-modal Retrieval, Nerf, and Vector Font Synthesis.

For my Ph.D research, I am highly interested in **Human-centric/Data-centric AI, Interactive ML, AI for Healthcare, Implicit Representation**.

In addition, I am also interested in some hot techniques. For examples, How do we learn knowledge from large models? How do we propose some methods to replace SGD? How do we link generative models and classification models? How do LLMs help XAI and AGI? In what scientific fields does the current Deep Learning still have great potential?

Education Backgrounds

Peking University — *China*

M.E. In Computer Science — *Sep. 2020 - June. 2023*

- Supervisor: Prof. Yuesheng Zhu.
- Co-Supervisor: Dr. Weiyang Liu & Dr. Lanqing Hong.

South China University of Technology — *China*

B.E. In Automation — *Sep. 2016 - June. 2020*

- Research Award: The First Prize of National Smart Car Competition.
- GPA: 3.80/4.00.

Publications (Accepted)

Continual Learning by Modeling Intra-Class Variation

Transactions on Machine Learning Research (TMLR)

Longhui Yu, Tianyang Hu, Lanqing Hong, Zhen Liu, Adrian Weller, Weiyang Liu — *Oct. 2022*

- We model the representation variation for old-class and diversify the collapsed gradients.
- All positive Reviews. **LINK**

Generalizing and Decoupling Neural Collapse via Hyperspherical Uniformity Gap

ICLR 2023

Weiyang Liu*, Longhui Yu*, Adrian Weller, Bernhard Schölkopf — *Oct. 2022*

- We decouple Neural Collapse into minimal intra-class variability and maximal inter-class separability and unify them via hyperspherical uniformity.
- Positive Reviews & Valuable work. **LINK**

Dual-Curriculum Teacher for Domain-Inconsistent Object Detection in Autonomous Driving

BMVC 2022

Longhui Yu, Yifan Zhang, Lanqing Hong, Fei Chen, Zhenguo Li — *Dec. 2021*

- We propose the dual-curriculum strategy to help existing semi-supervised object detection methods learn autonomous driving data efficiently and effectively. **LINK**

Multi-Teacher Knowledge Distillation for Incremental Implicitly-Refined Classification

ICME 2022 (Oral)

Longhui Yu, Zhenyu Weng, Yuqing Wang, Yuesheng Zhu — *Oct. 2021*

- We propose Multi-Teacher Knowledge Distillation to help existing incremental learning methods better maintain super-class knowledge. **LINK**

Memory Replay with Data Compression for Continual Learning

ICLR 2022

Liyuan Wang*, Xingxing Zhang*, Kuo Yang, Longhui Yu, Chongxuan Li, Lanqing Hong, Shifeng Zhang, Zhenguo Li, Yi Zhong, Jun Zhu — *Oct. 2021*

- We propose to utilize compressing methods to reserve the memory buffer effectively.
- We further propose a DPP-based method to determine the optimal compression rate. **LINK**

Submissions

MaskNeRF: Masked Neural Radiance Fields for Sparse View Synthesis — *In Submission (CVPR 2023)*

Shoukang Hu, Kaichen Zhou, Longhui Yu, Lanqing Hong, Tianyang Hu, Gim Hee Lee, Zhenguo Li — *Oct. 2022*

- We found the different optimization difficult of different pixels and further propose two kinds of mask to learn the hard-optimized pixels.

DeepVecFont-v2: Exploiting Transformers to Synthesize Vector Fonts with Higher Quality — *In Submission (CVPR 2023)*

Yuqing Wang, Yizhi Wang, Longhui Yu, Yuesheng Zhu, Zhouhui Lian — *Aug. 2022*

- We explore the potentials of Transformer to synthesize vector fonts with higher quality.

Focal-Global Distillation and Augmented Shortcut for Incremental Transformer-based Fine-grained Cross-modal Retrieval — *In Submission (CVPR 2023)*

Hanlin Li, Longhui Yu, Yusheng Tao, Yuqing Wang, Zhenyu Weng, Yuesheng Zhu — *Aug. 2022*

- We first propose the focal and global distillation to resist the catastrophic forgetting in the incremental fine-grained cross-modal retrieval.

Research Internships

University of Cambridge — *England*

Research Assistant — *Jan. 2022 - Feb. 2023*

- Work in Representation Learning & Distribution Shifts.
- Work with Dr. Weiyang Liu & Prof. Adrian Weller & Prof. Bernhard Schölkopf.

National University of Singapore — *Singapore*

Research Assistant — *June. 2021 - Jan. 2022*

- Work in Autonomous Driving & Distribution Shifts.
- Work with Dr. Lanqing Hong & Prof. Jiashi Feng.

Professional Services

Reviewer **CVPR 2023**, IEEE Conference on Computer Vision and Pattern Recognition

Reviewer **ACML 2022**, Asian Conference on Machine Learning

Reviewer **BMVC 2022**, British Machine Vision Conference

Honors & Awards

2020	**Outstanding Graduate**, The Outstanding Graduate of South China University of Technology	*China*
2019	**The First Prize**, The 14th National University Students' Smart Car Competition	*China*
2019	**Scholarship**, The Scholarship of South China University of Technology	*China*
2018	**Scholarship**, The Scholarship of South China University of Technology	*China*
2017	**Scholarship**, The Scholarship of South China University of Technology	*China*

Skills

Coding	Python, Pytorch, C, Arm, Ros, Matlab, Latex
Hobbies	Basketball, Football, Sing