

YUN-HAO CAO

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EDUCATION

Nanjing University 2018.09 – 2024.06 (Expected)

PhD Candidate Computer Science and Technology, LAMDA Supervisor Prof. Jianxin Wu

Nanjing University 2014.09 – 2018.06

Bachelor Computer Science and Technology, GPA 90.48 (Rank 3/18)

RESEARCH/INTERN EXPERIENCE

Selected Research on Self-Supervised Learning 2020.09 – Current

Research Focus on self-supervised learning in deep learning, which learns from unlabeled data

- Find and analyze the phenomenon that a randomly-initialized CNN can localize objects well and apply it into supervised/self-supervised learning (published at CCF-A conference AAAI2022); The theoretical analysis is given in an extended version (published at CCF-A journal TPAMI).
- Theoretically analyze and design a self-supervised method based on instance discrimination and achieve the state-of-the-art results when training vision transformers from scratch on small datasets (published at CCF-B conference ECCV2022).
- Propose quantization-friendly self-supervised learning which achieves significant improvements under different quantization configurations (published at CCF-B conference ECCV2022).
- Propose the guidelines for training universally slimmable networks under self-supervised learning, which produce sub-networks of different widths by training once (published at CCF-A conference CVPR2023).
- Propose a single-branch self-supervised algorithm, which greatly improves the training efficiency, model efficiency and data efficiency (submitted to CCF-A conference AAAI2024).

Research on Neural Random Subspace 2018.06 – 2020.09

Research Propose a random subspace method based on deep neural networks and apply it into various tasks

- Propose the Neural Random Subspace (NRS) method (published at CCF-B journal Pattern Recognition).
- Propose Random Subspace Sampling (RSS) based on NRS to handle missing values (Published at CCF-B journal JCST).

Recognition and Detection of Early Stomach Cancers 2019.07 – 2019.12

Project Cooperative project with Nanjing Gulou Hospital to recognize and detect early stomach cancer.

- Achieve the classification accuracy of 87.5% and the detection accuracy of 73.6%, reaching the international advanced level at that time.

Huatai Securities Internship Information and Technology Department 2018.06 – 2018.08

- Extract stock features over the years and design daytime stock trading strategies (online test).
- CUDA-based Monte Carlo algorithm acceleration (internal project approval).

MEGVII Technology Internship Beijing Research Institute 2021.12 – 2022.08

- Research on combining self-supervised learning and model quantization (published at ECCV2022).
- Research on combining self-supervised learning and network pruning (published at CVPR2023).

Ant Group Internship Platform and Technology Group 2023.05 – 2023.09

- Research about large multimodal models (e.g., BLIP-2) and parameter-efficient tuning methods.

PUBLICATIONS

Conference

- **Rethinking the Route Towards Weakly Supervised Object Localization** [[arXiv](#), [paper](#), [code](#)]
Chen-Lin Zhang, [Yun-Hao Cao](#), Jianxin Wu
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2020
- **A Random CNN Sees Objects: One Inductive Bias of CNN and Its Applications** [[arXiv](#), [paper](#), [code](#)]
[Yun-Hao Cao](#), Jianxin Wu
The 34th AAAI Conference on Artificial Intelligence (AAAI), 2022, Oral Presentation
- **Training Vision Transformers with Only 2040 Images** [[arXiv](#), [paper](#), [code](#)]
[Yun-Hao Cao](#), Hao Yu, Jianxin Wu
In Proceedings of the 17th European Conference on Computer Vision (ECCV), 2022
- **Synergistic Self-supervised and Quantization Learning** [[arXiv](#), [paper](#), [code](#)]
[Yun-Hao Cao](#), Peiqin Sun, Yechang Huang, Jianxin Wu, Shuchang Zhou
In Proceedings of the 17th European Conference on Computer Vision (ECCV), 2022, Oral Presentation
- **Worst Case Matters for Few-Shot Recognition** [[arXiv](#), [paper](#), [code](#)]
Minghao Fu, [Yun-Hao Cao](#), Jianxin Wu
In Proceedings of the 17th European Conference on Computer Vision (ECCV), 2022
- **Three Guidelines You Should Know for Universally Slimmable Self-Supervised Learning** [[arXiv](#), [code](#)]
[Yun-Hao Cao](#), Peiqin Sun, Shuchang Zhou
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2023

Journal

- **Neural Random Subspace** [[arXiv](#), [paper](#), [code](#)]
[Yun-Hao Cao](#), Jianxin Wu
Pattern Recognition (PR), 2021
- **Random Subspace Sampling for Classification for Missing data** [[paper](#), [code](#)]
[Yun-Hao Cao](#), Jianxin Wu
Journal of Computer Science and Technology (JCST), 2023
- **Tobias: A Random CNN Sees Objects**
[Yun-Hao Cao](#), Jianxin Wu
IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2023

Manuscript

- **On Improving the Algorithm-, Model-, and Data- Efficiency of Self-Supervised Learning**
[Yun-Hao Cao](#), Jianxin Wu
- **Rethinking Self-supervised Learning: Small is Beautiful** [[arXiv](#), [paper](#), [code](#)]
[Yun-Hao Cao](#), Jianxin Wu
In arXiv preprint arXiv:2103.13559, 2021

AWARDS

<i>Huawei Scholarship</i>	2022.10
<i>First Prize of Bank of Jiangsu 2019 National Undergraduate Talent Challenge</i>	2019.09
<i>National Third Prize of the 3rd China Data Mining Competition</i>	2018.08
<i>First Prize Outstanding Scholarship of Kuang Yaming College</i>	2017.11
<i>First Prize Outstanding Scholarship of Computer Science and Technology Department</i>	2015.11
<i>Provincial First Prize of the National High School Math League</i>	2013
<i>Provincial First Prize of the National High School Physics League</i>	2013

OTHERS

- Reviewer: Conference (ECCV'20, ICPR'20, IJCAI'21, ICLR'22, CVPR'22, ECCV'22, NeurIPS'22, NeurIPS'23, ICLR'23, CVPR'23, ICML'23, ICCV'23, AAAI'24, ICLR'24), Journal (ACTA, PR, TPAMI)
- Teaching Assistant: Pattern Recognition Spring 2022, Pattern Recognition Spring 2023 [[Course Page](#)]
- Skills: English—skilled (CET-4: 604, CET-6: 560), Coding—skilled (python C/C++)