

Xindi (Cindy) Wu

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Education

Princeton University

Ph.D. student, Computer Science Department, School of Engineering and Applied Science

Princeton, NJ

Aug. 2022 - Now

Advisor: Olga Russakovsky

Carnegie Mellon University

Master of Science in Computer Vision, Robotics Institute, School of Computer Science

Pittsburgh, PA

Aug. 2020 - Dec. 2021

Advisor: Deva Ramanan

Xi'an Jiaotong University

Bachelor of Science in Computer Science, Honors Youth Program

Xi'an, China

Sept. 2016- July 2020

Advisors: Jinjun Wang & Pengju Ren

Publications & Preprints

- [15] Corgi: Compositional Memory-Guided Video Generation
X. Wu, U. Singer, Z. Lin, A. Madotto, P.A. Crook, YE. Xu, XL. Dong, O. Russakovsky, S. Moon *In submission, 2023*
- [14] [Vision-Language Dataset Distillation](#)
X. Wu, B. Zhang, Z. Deng, O. Russakovsky *In submission, Arxiv 2023*
- [13] [Pix2Map: Cross-modal Retrieval for Inferring Street Maps from Images](#)
X. Wu, K. Lau, F. Ferroni, A. Osep, D. Ramanan *CVPR 2023*
- [12] [Ego4D: Around the World in 3,000 Hours of Egocentric Video](#)
K. Grauman,..., **X. Wu**,..., Jitendra Malik *CVPR 2022*
- [11] [Toward Learning Robust and Invariant Representations with Alignment Regularization and Data Augmentation](#)
H. Wang, Z. Huang, **X. Wu** and EP. Xing *KDD 2022*
- [10] [CryoETGAN: Cryo-electron Tomography Image Synthesis Using Unpaired Image Translation](#)
X. Wu, C. Li, H. Wei, H. Deng, J. Zhang and M. Xu *Frontiers in Physiology Computational Physiology and Medicine, 2022*
- [9] [Squared l2 Norm as Consistency Loss for Leveraging Augmented Data to Learn Robust and Invariant Representations](#)
H. Wang, Z. Huang, **X. Wu** and EP. Xing *Arxiv 2021*
- [8] [Marrying Motion Forecasting and Offline Model-Based Reinforcement Learning for Self-Driving Cars](#)
S. Pande and **X. Wu** *Preprint 2021*
- [7] [High Frequency Component Helps Explain the Generalization of Convolutional Neural Networks.](#)
H. Wang, **X. Wu**, Z. Huang, EP. Xing *CVPR 2020*
- [6] [Transferable Adversarial Attacks on Deep Reinforcement Learning](#)
X. Pan, Y. Cao, **X. Wu**, E. Zelikman, C. Xiao, Y. Sui, R. Chakraborty, RS. Fearing *Workshop on Adversarial ML at CVPR 2020*
- [5] [Reducing Exploitation of Data Idiosyncrasy Helps Robustify Trained Models](#)
X. Wu, H. Wang, E. Zelikman, M. Xu and EP. Xing *Preprint 2020*
- [4] [Regularized Adversarial Training \(RAT\) for Robust Cellular Electron Cryo Tomograms Classification](#)
X. Wu, Y. Mao, H. Wang, X. Zeng, X. Gao, EP. Xing, M. Xu *BIBM 2019*
- [3] [Template-based and Template-free Approaches in Cellular Cryo-electron Tomography Structural Pattern Mining.](#)
X. Wu, X. Zeng, Z. Zhu, X. Gao and M. Xu *Computational Biology, Codon Publications, Brisbane, Australia, 2019*
- [2] [Deep Self-Paced Learning for Semi-supervised Person Re-identification Using Multi-View Self-Paced Clustering](#)
X. Xin, **X. Wu**, Y. Wang, J. Wang *ICIP 2019*
- [1] [Multitask Learning With Enhanced Modules](#)
Z. Zheng, Y. Wei, Z. Zhao, **X. Wu**, Z. Li and P. Ren *DSP 2018*

Research Experience

Princeton University

Ph.D. student advised by Prof. Olga Russakovsky

Princeton, NJ

Sept. 2022 - now

- We propose a vision-language dataset distillation method for distilling a large-scale dataset consisting of (image, text) pairs into a smaller dataset, while maintaining much of the original dataset's information relevant to training vision-language models [14].

Meta Reality Lab

Research Scientist Intern w/ Dr. Shane Moon

Redmond, WA

May. 2023 - Aug. 2023

- We introduce compositional video generation, a new paradigm for multi-scene T2V generation guided by subject finetuning. Arxiv coming soon [15].

Robotics Institute - CMU Argo AI Center for Autonomous Vehicle Research

CMU Sponsered Capstone | Research Assistant w/ Prof. Deva Ramanan

Pittsburgh, PA

Jan. 2021 - Jan. 2022

- Proposed a contrastive cross-modal approach to dynamic street map construction from camera data. Trained the graph encoder and image encoder with a shared latent space building on recent advances in multimodal representation learning [13].
- Defined a new task and benchmark for map maintenance, evaluating both fidelity and generalization. Demonstrated that this

approach has the ability to generalize both to novel observations within a city as well as to unseen cities.

Snap Inc. Perception Team

New York, NY

Research Intern w/ Dr. Alireza Zareian and Dr. Chen Wang

May 2021 - Aug. 2021

- Developed a sample-efficient method to generate self-supervised vision and language representations incorporating ideas from CLIP, supporting a variety of downstream zero-shot tasks including classification, object detection, and segmentation.
- Achieved a 24% relative improvement on top-1 ImageNet accuracy over CLIP trained with the Conceptual Captions 3M dataset.

Facebook AI Research & Carnegie Mellon University, Robotics Institute

Pittsburgh, PA

Research Assistant w/ Prof. Kris Kitani

Sept. 2020 - Dec. 2020

- Developed de-identification tool based on object tracking to efficiently de-identify arbitrary objects including faces, license plates, etc., in egocentric video at near real time, allowing 3x faster de-identification than other SOTA methods [12].

Megvii Research (Face++)

Beijing, China

Computer Vision Research Intern w/ Banghui Li

June 2020 - Sept. 2020

- Researched & designed few shot learning models built on Detectron2 with metric learning based methods for object detection.
- Implemented mixup data augmentation and contrastive loss to improve the post-Region Proposal Network relation graph.

Carnegie Mellon University, Language Technology Institute

Pittsburgh, PA

Research Intern w/ Haohan Wang

Apr. 2019 - June 2020

- Demonstrated a relationship between the frequency spectrum of image data and generalization behavior of CNNs [5, 7, 9, 11].
- Designed a regularization scheme that penalizes large differences between adjacent components within kernels. [Link](#)

Carnegie Mellon University, Computational Biology Department

Pittsburgh, PA

Research Assistant w/ Prof. Min Xu

Mar. 2019 - June 2020

- Proposed Regularized Adversarial Training to push the decision boundary away from training data while maximizing accuracy on unperturbed examples to improved the robustness of subtomogram SoTA classification models [3, 4].
- Designed a model to achieve unsupervised image-to-image translation for Cryo-ET images which is stable to train and capable of generating plausibly diverse image samples [10].

Xi'an Jiaotong University, Institute of Artificial Intelligence and Robotics

Xi'an, China

Research Assistant w/ Prof. Jinjun Wang & Prof. Pengju Ren

Dec. 2017 - Feb. 2019

- Introduced a self-paced regularizer to select reliable samples for fine-tuning each CNNs and implemented self-paced clustering.
- Designed an inverse adversarial learning regime which take classifiers to supervise each generator extract discriminate features and take discriminators for regularizing generators to learn complementary features [1, 2].

Other Projects

Transferable Adversarial Attacks on Deep Reinforcement Learning

Jan. 2020 - March 2020

- Implemented the attacks to minimize the rewards of substitute target policies against DRL.
- Outperforms the existing attacks when the system dynamics or the action space changes in both HalfCheetah and Walker2d.

Robustifying Trained Models by Reducing Exploitation of Data Idiosyncrasy [Link](#)

March 2019 - May 2019

- Developed a mathematical framework to put bounds on previously-identified trade-off between robustness & accuracy.
- Implemented three lightweight methods to increase model robustness to verify the framework's implications.

Multitask Learning With Enhanced Modules

Jan. 2018 - May 2018

- Used 5.23x fewer generations to achieve 99% accuracy on a source-to-target MNIST classification task compared with DeepMind's PathNet. Increased the accuracy of CIFAR- SVHN transfer task by x1.9. Achieved 70.75% accuracy on miniImageNet

Smooth Kernels Improve Adversarial Robustness

Aug. 2019 - Oct. 2019

- Designed a regularization scheme that penalizes large differences between adjacent components within kernels
- Achieved numerically the best adversarially robustness across most settings, suggesting the effective of smooth regularization

Talks and Poster Presentations

- Corgi: Compositional Memory-Guided Video Generation *Cornell Tech, New York, 2023 Nov.*
- Pix2Map: Cross-modal Retrieval for Inferring Street Maps from Images *CVPR, Vancouver, 2023 June*
- Regularized Adversarial Training for Robust Cellular Electron Cryo Tomograms Classification *BIBM, San Diego, 2019 Nov.*

Professional Service

- **Reviewer** - ICLR 24', ICRA 24', Neurips 23', CVPR 23'/22', ICCV 23', ECCV 22', Neurips Interpolate workshop 22', BMVC 20', IJCAI 20'
- **Committee Member** - Diversity, Equity and Inclusion Committee in Robotics Institute, CMU
- **Conference Chair** - SIGBOVIK 2021
- **Volunteer** - vGHC(Grace Hopper Celebration of Women in Computing) 2021 Volunteer
- **Panelist** - Robotics Institute MS Student Panel, 2021, Robotics Institute Summer Scholars (RISS) program 2021
- **Co-Host** - Weekly RI Meets! 2021
- **Mentor** - CMU Society of Women Engineers (SWE) mentoring program 2021

Skills

Languages: Python, C/C++/C#, Matlab, R, SQL, Bash, HTML/CSS

Development Tools: Spark, Hadoop, RabbitMQ, Celery, Docker

Deep Learning Tools: PyTorch, TensorFlow, Keras, Caffe, OpenCV, MuJoCo, OpenAI Gym