Xindi (Cindy) Wu

+1 (412)-726-0470 | xindiw@andrew.cmu.edu | Website | Scholar | Github

Education

Carnegie Mellon University *Pittsburgh, PA*
Master of Science in Computer Vision, School of Computer Science Robotics Institute *Aug. 2020 - Dec. 2021*
Selected Courses: Computer Vision, Deep Reinforcement Learning for Robotics, Math Foundation for Robotics, Visual Learning and Recognition, Geometry Based Computer Vision

Xi'an Jiaotong University *Xi'an, China*
Bachelor of Engineering in Computer Science, Honors Youth Program *Sept. 2016- July 2020*
Selected Courses: Data Structures and Algorithms, Intro to Compilers, Computer Organization, Computer Graphics

Publications & Preprints

[1] Pix2Map: Learning to Regress Street Maps from Images
Xindi Wu, KwunFung Lau, Francesco Ferroni, Deva Ramanan
Under review at ECCV, 2022

[2] Ego4D: Around the World in 3,000 Hours of Egocentric Video
Kristen Grauman,..., **Xindi Wu**,..., Jitendra Malik
CVPR, 2022

[3] CryoETGAN: Cryo-electron Tomography Image Synthesis Using Unpaired Image Translation
Xindi Wu, Xiangrui Zeng, Chengkun Li, Haocheng Wei, Jing Zhang, Min Xu
Frontiers in Physiology Computational Physiology and Medicine, 2022

[4] Squared l2 Norm as Consistency Loss for Leveraging Augmented Data to Learn Robust and Invariant Representations
Haohan Wang, Zeyi Huang, **Xindi Wu**, Eric P. Xing
Preprint, 2021

[5] High Frequency Component Helps Explain the Generalization of Convolutional Neural Networks.
Haohan Wang, **Xindi Wu**, Zeyi Huang, Eric P. Xing
***Oral**, CVPR 2020*

[6] Transferable Adversarial Attacks on Deep Reinforcement Learning
Xinlei Pan, Yulong Cao, **Xindi Wu**, Eric Zelikman, Chaowei Xiao, Yanan Sui, Rudrasis Chakraborty, Ronald S Fearing
Workshop on Adversarial ML at CVPR, 2020

[7] Reducing Exploitation of Data Idiosyncrasy Helps Robustify Trained Models
Xindi Wu, Haohan Wang, Eric Zelikman, Eric P. Xing, Min Xu
Preprint, 2020

[8] Regularized Adversarial Training (RAT) for Robust Cellular Electron Cryo Tomograms Classification
Xindi Wu, Yijun Mao, Haohan Wang, Xiangrui Zeng, Xin Gao, Eric P. Xing, Min Xu
***Oral**, IEEE Int. Conf. on Bioinformatics and Biomed. (BIBM) 2019*

[9] Template-based and Template-free Approaches in Cellular Cryo-electron Tomography Structural Pattern Mining.
Xindi Wu, Xiangrui Zeng, Zhenxi Zhu, Xin Gao, Min Xu
Computational Biology, Codon Publications, 2019

[10] Deep Self-Paced Learning for Semi-supervised Person Re-identification Using Multi-View Self-Paced Clustering
Xiaomeng Xin, **Xindi Wu,** Yuechen Wang, Jinjun Wang
ICIP, 2019

[11] Multitask Learning With Enhanced Modules
Zishuo Zheng, Yadong Wei, Zixu Zhao, **Xindi Wu,** Zhengcheng Li, Pengju Ren
IEEE 23rd Int. Conf. on Digital Signal Processing (DSP) 2018

Research Experience

Carnegie Mellon University, Robotics Institute & ArgoAI Center for Autonomous Vehicle Research *Pittsburgh, PA*
Multimodal, Vision and Graph | *Capstone* | *Research Assistant w/ Prof. Deva Ramanan* *Jan. - May, Sept. - Now, 2021*
- Proposed a contrastive cross-modal approach to dynamic street map construction from camera data. Built on recent advances in multimodal representation learning to train a graph and image encoders with a shared latent space [1]. Slides
- Defined a new task and benchmark for map maintenance, evaluating both fidelity and generalization. Leveraged the Argoverse dataset to define a comprehensive and rigorous set of evaluation criteria.

Snap Inc. Perception Team *New York, NY*
Multimodal, Vision and Language Zero-shot Learning | *Research Intern* *May 2021 - Aug. 2021*
- Developed a sample-efficient method for self-supervised vision and language representations incorporating contrastive learning and self-distillation, for downstream zero-shot tasks including classification, object detection, and segmentation. Slides
- Achieved a 24% relative improvement on top-1 ImageNet accuracy over CLIP trained with the Conceptual Captions 3M dataset.

Carnegie Mellon University, Robotics Institute & Facebook AI Research *Pittsburgh, PA*
Ego4d: Massive-Scale Egocentric Video Process | *Research Assistant w/ Prof. Kris Kitani* *Sept. 2020 - Dec. 2020*
- Developed object-tracking-based de-identification tool to efficiently de-identify arbitrary objects (e.g. faces, license plates), in hundreds of hours of egocentric videos at near real time [2]. Slides
- Increased human-in-the-loop de-identification speed by 3x (vs Adobe tools), causing several other schools to adopt the method.

Megvii Research (Face++) *Beijing, China*
Few-shot Object Detection | *Research Intern* *June 2020 - Sept. 2020*
- Proposed loosened-embedding metric learning based methods for few shot object detection.
- Applied mixup data augmentation and contrastive loss to improve the post-Region Proposal Network relation graph.

Carnegie Mellon University, Language Technology Institute Pittsburgh, PA
Robust Machine Learning | *Research Intern w/ Prof. Eric Xing and Haohan Wang* *Apr. 2019 - Sept. 2020*
- Experimented on robustness and accuracy trade-off regarding image frequency components under different training heuristics. Explained that label-natural data prefers to pick up low frequency, yet lable-shuffled data can pick up at either low or high [5].
- Implemented a regularization scheme that penalizes large differences between adjacent components within kernels. Paper
- Developed framework bounding the trade-off of robustness & accuracy, implementing weight-based robustification methods [7].

Carnegie Mellon University, Computational Biology Department *Pittsburgh, PA*
Biomedical Image Analysis | *Research Assistant w/ Prof. Min Xu* *Mar. 2019 - June 2020*
- Proposed regularized adversarial training method to push the decision boundary away from training data while maximizing accuracy on unperturbed examples to improved the robustness of subtomogram classification models [8].
- Designed generative model for unsupervised Cryo-ET image synthesis, capable of generating plausibly diverse image samples [3].

UC Berkeley, Biomimimetic Millisystems Lab *Remote*
Reinforcement Learning, Adversarial attacks | *Research Collaborator* *Jan. 2020 - Feb. 2020*
- Implemented attacks to minimize the rewards of substitute target policies and trained the same policy with different networks. Outperformed the existing attacks when the dynamics or the action space changes in both HalfCheetah and Walker2d [6].

Xi'an Jiaotong University, Institute of Artificial Intelligence and Robotics *Xi'an, China*
Person Re-id, Multitask Learning | *Research Intern w/ Prof. Pengju Ren & Jinjun Wang* *Dec. 2017 - Feb.2019*
- Introduced a self-paced regularizer to select reliable samples for fine-tuning each CNNs and implemented self-paced clustering. Improved mAP & Rank-1 by 4.44% & 2.2% on person re-identification using ResNet50; 6.04% & 4.6% on DenseNet121 [10].
- Performed experiments on CIFAR-SVHN transfer tasks, achieved x1.9 accuracy with 5.23x fewer generations [11].

Professional Service

- **Reviewer** - CVPR 2022, BMVC 2020, IJCAI 2020
- **Committee Member** - Diversity, Equity and Inclusion Committee in Robotics Institute, CMU

Volunteering

- **Volunteer** - vGHC(Grace Hopper Celebration of Women in Computing) *Sept. 2021*
- **Co-Host** - Weekly RI Meets (to increase the engagement between RI people) *Apr. 2021 - Oct. 2021*
- **Mentor** - CMU Society of Women Engineers (SWE) mentoring program *Aug 2021 - Dec 2021*
- **Conference Chair** - SIGBOVIK *Apr. 2021*
- **Teaching Assistant** - CMU CB 02-740: Bioimage Informatics *Aug 2019 - Dec 2019*

Skills

Languages: Python, C/C++/C#, Matlab, R
Development Tools: Spark, Celery, Docker
Deep Learning Tools: PyTorch, PyTorch Lightning, TensorFlow, Keras, Caffe, OpenCV, MuJoCo, OpenAI Gym