Xuefeng Hu

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University of Southern California
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Education

08/2018 – 01/2024 **University of South California**
Los Angeles, CA Ph.D. in Computer Science
Advisor: Ram Nevatia

09/2017 – 06/2018 **Columbia University**
New York, NY M.S. in Computer Science
Advisor: Shih-Fu Chang

09/2015 – 05/2017 **University of Michigan**
Ann Arbor, MI B.S.E. in Computer Science Engineering
Advisor: Jia Deng

09/2013 – 08/2017 **Shanghai Jiao Tong University**
Shanghai, China B.S.E. in Electrical and Computer Engineering

Publication

Hu, X., Zhang, K., Sun, M., Chen, A., Kuo, C., & Nevatia, R. (2023). BaFTA: Backprop-Free Test-Time Adaptation for Zero-shot Vision Language Models. Under ICML Review.

Hu, X., Zhang, K., Xia, L., Chen, A., Luo, J., Wang, K., Qiao, N., Zeng, X., Sun, Y., Sun, M., Kuo, C., & Nevatia, R. (2023). ReCLIP: Refine Contrastive Language Image Pre-Training with Unsupervised Domain Adaptation. In 2024 IEEE winter conference on applications of computer vision (WACV Oral, Award Finalist). IEEE.

Hu, X.*, Liu, Z*., & Nevatia, R. (2023). Zero-Shot Detection via Image-Language Knowledge Distillation on Weakly Supervised Regions. In 2024 IEEE winter conference on applications of computer vision (WACV). IEEE.

Hu, X., Uzunbas, G., Chen, S., Wang, R., Shah, A., Nevatia, R., & Lim, S. N. (2021). Mixnorm: Test-time adaptation through online normalization estimation. arXiv preprint arXiv:2110.11478.

Hu, X., Zhang, Z., Jiang, Z., Chaudhuri, S., Yang, Z., & Nevatia, R. (2020 August). SPAN: Spatial Pyramid Attention Network for Image Manipulation Localization. In Proceedings of the European Conference on Computer Vision (ECCV) (pp. 0-0).

Zheng, Z., Wei, J., **Hu, X.**, Zhu, H., & Nevatia, R. (2023). Large Language Models are Good Prompt Learners for Low-Shot Image Classification. arXiv preprint arXiv:2312.04076. .

Hu, Z., Yang, Z., **Hu, X.**, & Nevatia, R. (2021). SimPLE: Similar Pseudo Label Exploitation for Semi-Supervised Classification. In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (pp. 15099-15108).

Karaman, S., Lin, X., **Hu, X.**, & Chang, S. F. (2019, June). Unsupervised Rank-Preserving Hashing for Large-Scale Image Retrieval. In Proceedings of the 2019 on International Conference on Multimedia Retrieval (pp. 192-196). ACM.

Professional Experience

05/2022 – 8/2022
Seattle, Washington

Amazon Lab126
AI Research Internship
Developed a novel, robust and effective source-free unsupervised adaptation algorithm (ReCLIP) that improves the average zero-shot accuracy of CLIP by 5.11% on 22 classification benchmarks without requiring additional supervision.
Accepted by WACV 2024 with Oral Presentation, selected as award finallist.

05/2021 – 8/2021
Boston, MA

Facebook AI Applied Research
Research Internship
Developed a novel Testing-Time Adaptation method that can adapt any pre-trained model into shifted testing distributions in a purely online fashion. The new method has significant performance gain compared to the existing SOTA in several challenging and practical settings.

05/2020 – 12/2020
Boston, MA

Facebook AI Applied Research
Research Internship
Proposed a novel Part-level SimCLR framework for the weakly-supervised fine-grained anomaly detection task. The proposed method achieved SOTA performance on several anomaly detection benchmarks.

09/2020 – 11/2020
Los Angeles, CA

University of Southern California
Teaching Assistant for Advanced Computer Vision (CSCI677)
In charge of the designing and grading the homeworks and exams; in charge of giving coding tutorials in class; in charge of holding office hours to answer students' questions.

09/2014 – 08/2015
Shanghai, China

Shanghai Jiao Tong University Racing Team
Research and Development Engineer.
In charge of the design of the Panel Board of the formula car we prepared for the 2015 Formula Student China Competition.

Research Projects

01/2023 – present
Los Angeles, CA
Research Assistant

Backpropagation-Free Testing-Time Adaptation for Vision-Language Models
Advised by Ram Nevatia

- Developed a novel Backpropagation-Free Test-time Adaptation algorithm to improve the zero-shot performance of large-scale pre-trained vision-language models such as CLIP at inference time.
- The proposed method improves the baseline vision-language model CLIP by 4.52% average improvement on 15 datasets, including ImageNet and its natural distribution shift variants.
- Under Conference Review.

05/2022 – 12/2022
Seattle, Washington
Research Intern

Source-Free Domain Adaptation for Vision-Language Models
Mentored by Ke Zhang

- Developed a novel, robust and effective Source-Free Domain Adaptation algorithm that improves the average zero-shot accuracy of CLIP by 5.11% on 22 classification benchmarks without requiring additional supervision.
- Work accepted at WACV 2024 with Oral Presentation.

08/2022 – 03/2023
Los Angeles, CA
Research Assistant

Zero-Shot Object Detection via Image-Language Knowledge Distillation
Advised by Ram Nevatia

- Improved a distillation framework that transforms CLIP into a detection network by developing a novel distillation region selection algorithm.
- Improved the SOTA zero-shot object detection work by 2.7% on novel categories and 0.4% on base categories (AP50) on MS-COCO dataset.
- Work accepted at WACV 2024.

05/2021 – 12/2021
Los Angeles, CA
Research Intern

Testing-Time Adaptation
Mentored by Gokhan Uzunbas

- Developed a novel Test-time Adaptation algorithm that adapt the pre-trained model towards mixed distribution shifts with online test examples at inference time.
- The new method has significant performance gain compared to the existing SOTA in several challenging and practical settings.

05/2020 – 12/2020
Los Angeles, CA
Research Intern

Weakly-supervised Fine-Grained Anomaly Detection
Mentored by Gokhan Uzunbas

- Proposed a novel Part-level SimCLR framework for the weakly-supervised fine-grained anomaly detection task.
- The proposed method achieved SOTA performance on several anomaly detection benchmarks.

06/2020 – 11/2020
Los Angeles, CA
Research Assistant

Similar Pseudo Label Exploitation for Semi-Supervised Classification
Advised by Ram Nevatia

- Together with the collaborators, we proposed a novel loss term that explores the relationship between unlabelled data pairs with similar pseudo labels. The resulting algorithm achieves state-of-the-art performance in semi-supervised image classification task on several standard benchmarks.
- Work accepted by CVPR 2021

07/2019 – 03/2020
Los Angeles, CA
Research Assistant

Image Forensics Detection
Advised by Professor Ram Nevatia.

- Proposed a novel pyramid self-attention based architecture for image forensic detection.
- Work accepted by ECCV 2020.

01/2019 – 07/2020
Los Angeles, CA
Research Assistant

Few-Shot Learning with Covariance Estimation
Advised by Professor Ram Nevatia.

- Proposed to improve few-shot classification accuracy by estimating the true covariance for novel categories with an attention-based meta-learner architecture.

03/2018 – 6/2018
New York, NY
Research Assistant

Nearest Neighbor Preserving Hashing
Advised by Professor Shih-Fu Chang.

- Proposed a Nearest Neighbor Preserving Hash (Neuron) Net, along with a triplet-based constrain optimization procedure using query-central batches.
- Outperforms the previous start-of-art Hashing methods such as Neighbor Sensitive Hashing, etc.
- Work accepted by ICMR 2019

09/2016 – 11/2016
Ann Arbor, MI
Undergraduate Research Assistant

Movie Face Clustering
Advised by Professor Jia Deng.

- Designed a way to extract positive (same) and negative (different) relations between face tracks in the movie only based on the cuts and scene threads information. The result can help improve the performance of the movie face clustering algorithm.
- Implemented a web based well designed labeling system. With the labeling system, me and Mingzhe labeled over 50 movies and 30000 face tracks. The results provided the necessary data to train our model.
- Researched and implemented several clustering algorithms such as Hierarchical cluster, Xmeans cluster and Kmeans cluster, with several cluster number determination method such as the Bayesian Information Criterion and Elbow method. Provided the baseline results on the movie face clustering problem.
- Contributed to the design of the new proposed movie face clustering algorithm, including the feature selections and clustering scheme

05/2016 – 8/2016
Ann Arbor, MI
Undergraduate Research Assistant

Quantum machine learning and quantum algorithms
Advised by Professor Yaoyun Shi.

- Mastered the theoretical backgrounds, computation foundations, basic theories, proof frameworks and important algorithms including Grover Search Algorithm, Quantum Fourier Transformation, Phase Estimation, Shor's Algorithm, Amplitude Amplification, Discrete and Continuous Quantum Random Walk and some proof tricks of the Query and Gate complexity.
- Researched about several Quantum Machine Learning Algorithms such as Quantum Support Vector Machine and Quantum Kernel Method.
- Researched and mastered the improvements have been made in the last six year on quantum algorithms that solve linear systems and Hamiltonian Simulation problem.

Research Interests

Currently, my primary focus lies in the intricate realm of representation learning, particularly within the dynamic landscapes of domain adaptation, unsupervised learning, and semi-supervised learning. My passion extends to exploring diverse topics, including forensic detection, meta-learning, and the development of large-scale multi-modality models.

Awards

03/2022 **All America Chinese Youth Federation (AACYF)**
Member of "30 under 30" 2022.

03/2017 **University of Michigan**
James B. Angell Scholarship

12/2016,04/2016, 12/2015 **University of Michigan**
Dean's List

4/2016,12/2015 **University of Michigan**
University Honors

08/2015 **"TIC100" Smart City & IoT Business Challenge**
Finalist (National Top 8 teams)

08/2014 **Shanghai Jiao Tong University**
Merit Student at SJTU

04/2014 **Shanghai Jiao Tong University**
Outstanding Undergraduate Student Scholarship

12/2013 **2013 FALL University of Michigan-Shanghai Jiao Tong University Joint Institute Winter Design Expo**
Gold Metal

11/2013 **2013 FALL University of Michigan-Shanghai Jiao Tong University Joint Institute Robotic Racing Game**
Sliver Metal

10/2013 **Shanghai Jiao Tong University**
Outstanding Freshman Scholarship

11/2012 **2012 China High School Mathematics Competition**
National First Prize

Teaching

09/2022 – 12/2022 **Teaching Assistant**
Los Angeles, CA CSCI677 Advanced Computer Vision.

09/2020 – 12/2020 **Teaching Assistant**
Los Angeles, CA CSCI677 Advanced Computer Vision.

03/2014 – 06/2014 **Volunteer Tutor**
Shanghai, Xujing Neighborhood In charge of tutoring mathematics and physics for high school students in nearby community.

Skills

Languages, Libraries & Frameworks
C/C++, Python (PyTorch & TensorFlow), Java, SQL, Torch, JavaScript, R, Verilog

Software & Platforms
MATLAB, Git, Visual Studio, LaTeX, Photoshop, Lightroom