

Fengchun Qiao

PH.D. STUDENT, UNIVERSITY OF DELAWARE

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Research Interests

My research interests are machine learning, deep learning, and computer vision. Currently, I focus on developing robust and explainable models for Out-of-Distribution (OOD) generalization.

Education

University of Delaware

Ph.D. in Computer Science

Newark, DE, USA

February 2020 - Present

Institute of Software, Chinese Academy of Sciences

M.S. in Computer Science

Beijing, China

September 2016 - June 2019

Beijing Forestry University

B.Eng. in Electronic and Information Technology (GPA: 90.8/100)

Beijing, China

September 2012 - June 2016

Experience

Deep-REAL Lab, University of Delaware

Research Assistant. Advised by Prof. Xi Peng

Newark, DE USA

September 2022 - Present

- Single Domain Generalization [CVPR'20, CVPR'21, TPAMI'22]

We study a worst-case scenario where a model aims to perform well on many unseen distributions while only one single distribution is available for training. We further improve this work by uncertainty quantification for provable generalization guarantee.

- Topology-aware Out-of-Distribution Generalization [NeurIPS Workshop'22, ICLR'23]

As generalizing to arbitrary test distributions is impossible, we hypothesize that further structure on the topology of distributions is crucial in developing strong OOD resilience. To this end, we propose topology-aware robust optimization (TRO) that seamlessly integrates distributional topology in a principled optimization framework.

- Explainable Out-of-Distribution Generalization [CVPR'23]

Even though made accurate predictions, machine learning models might still yield unreliable explanations under distribution shifts. To develop robust explanations against OOD data, we propose an end-to-end model-agnostic learning framework Distributionally Robust Explanations (DRE).

Amazon Web Services (AWS) AI Labs

Applied Scientist Intern. Advised by Dr. Gukyeon Kwon and Dr. Zhiguo Wang

Remote

June 2021 - August 2021

- Probabilistic Models for Cross-Modal Retrieval

Probabilistic embeddings are proposed to handle the multiplicity of cross-modal retrieval while suffering from similarity miscalibration. To address it, we propose to calibrate the similarity for probabilistic embeddings by estimating the density ratio between the distributions of the two modalities.

Institute of Software, Chinese Academy of Sciences

Research Assistant. Advised by Prof. Hui Chen

Beijing, China

September 2016 - June 2019

- GAN-based Facial Expression Synthesis [CASA'18]

- Robust Facial Expression Recognition [ACII Asia'18, Acta Automatica Sinica'18]

Publications

Conference Proceedings

- C6. T. Li, F. Qiao, M. Ma, and X. Peng. "Are Data-driven Explanations Robust against Out-of-distribution Data?." In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2023.
- C5. F. Qiao and X. Peng. "Topology-aware Robust Optimization for Out-of-Distribution Generalization." In *International Conference on Learning Representations (ICLR)*, 2023.
- C4. F. Qiao and X. Peng. "Graph-Relational Distributionally Robust Optimization." In *NeurIPS 2022 Workshop on Distribution Shifts*, 2022.
- C3. F. Qiao and X. Peng. "Uncertainty-guided model generalization to unseen domains." In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2021.

- C2. **F. Qiao**, L. Zhao, and X. Peng. "Learning to learn single domain generalization." In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2020.
- C1. Z. Jiao, **F. Qiao**, N. Yao, Z. Li, H. Chen, and H. Wang. "An Ensemble of VGG Networks for Video-Based Facial Expression Recognition." In *2018 First Asian Conference on Affective Computing and Intelligent Interaction (ACII Asia)*, 2018.

Journals

- J3. X. Peng, **F. Qiao**, and L. Zhao. "Out-of-Domain Generalization From a Single Source: An Uncertainty Quantification Approach." *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, IEEE, 2022.
- J2. **F. Qiao**, N. Yao, Z. Jiao, Z. Li, H. Chen, and H. Wang. "Emotional facial expression transfer from a single image via generative adversarial nets." *Computer Animation and Virtual Worlds (CASA)*, Wiley Online Library, 2018.
- J1. N. Yao, Q. Guo, **F. Qiao**, H. Chen, and H. Wang. "Robust facial expression recognition with GANs." *Acta Automatica Sinica*, 2018.

Technical Reports

- T1. **F. Qiao**, N. Yao, Z. Jiao, Z. Li, H. Chen, and H. Wang. "Geometry-contrastive gan for facial expression transfer." *arXiv*, 2018.

Professional Services

Conference reviewer/Program committee

- ICML 2022-2023, NeurIPS 2022, AAAI 2023, ICCV 2023, CoLLAs 2023

Journal Reviewer

- TIP/TMM/CVIU/TCSVT/TIM

Honors & Awards

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| 2022 | NeurIPS 2022 Top Reviewer Award |
| 2022 | Outstanding Graduate Student Award , University of Delaware |
| 2021 | Distinguished Graduate Student Award , University of Delaware |
| 2018 | National Scholarship for Graduate Students , Ministry Of Education of the People's Republic of China |
| 2017 | CIKM AnalytiCup 2017 (Ranking: 4/1395) |
| 2017 | KDD CUP 2017 (Ranking: 16/3582) |