Kai Yao

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ABOUT ME

I am Ph.D candidate at the School of Engineering, University of Liverpool, supervised by Prof. Jie Sun, Prof. Kaizhu Huang, and Dr. Curran Jude. Currently, my main research interest lies in developing robust, domain generalizable machine learning algorithms to facilitate medical image analysis and auto-driving scenario understanding.
In spite of that, I have wide-ranging interests and extensive knowledge in image classification, segmentation, detection and generation. Meanwhile, strong coding capability allows me to build up prototypical neural nets easily and quickly, enabling good research and development capabilities. Overall, i'm self-motivated, excellent problem solver, and a go-getter.

EDUCATION

B.Eng. in Computer Science and Technology
Xi'an Jiaotong-Liverpool University
2014.9 - 2018.6

Ph.D. Candidate
University of Liverpool
2019.12 - Present

SKILLS

Programming Python (PyTorch, Tensorflow, MMCV, Detectron, etc.), C/C++, CUDA extension, SQL.
Miscellaneous Linux, LaTeX, Git, etc.

HONORS AND AWARDS

2019 - Full doctoral scholarship at University of Liverpool.

2021 - Top 5 in CrossMoDa2021 Challenge.

2022 - The third prize of 2020-2021 Outstanding Academic Papers of Suzhou Natural Science.

LINKS

HomePage Github
Google Scholar

RESEARCH PROJECT EXPERIENCE

Optimization by Regularization 2017.3 - 2018.9
- Used manifold learning principle to reveal the typical neural network's problem, and proposed a training strategy, Kernelized Min-Max Objective, to improve the classification performance on deep neural networks.

Biomedical Image Processing 2019.12 - 2021.3
- Built up a publicly available cell nuclei segmentation dataset for quantitative evaluation of cell culture analyzing tools by collaborating with bio-researchers.
- Designed a annotation-free methods based on content-style disentangled generative adversarial network for unsupervised cell nuclei segmentation.

Image Generation via Vision Transformer 2021.9 - Present
- Designed a query-based transformer encoder-decoder architecture for natural image outpainting.
- Proposed a image generation framework for bone growth prediction based on GPT, ODENet and VQGAN.

Transfer learning with Domain and/or Category Shift 2021.4 - Present
- Proposed a 3D unsupervised domain adaptation method for medical image segmentation framework based on content-style disentangled generative adversarial networks.
- Developed an unsupervised domain adaptation framework in auto-driving scenario with predictive epistemic uncertainty estimation.
- Developed an domain generalization method for medical images based on location-scale theory.
- Handling multi-target and unseen domains, we investigate the complicated Open Compound Domain Adaptation in street scenario, and propose a novel group-theory-based method (under review).
- Tackling both domain and category shift in absence of source data, we propose a novel framework to Source-free Universal Domain Adaptation (under review).

PUBLICATIONS

Yao K, et al. Explore Epistemic Uncertainty in Domain Adaptive Semantic Segmentation[C], ACM Conference on Information and Knowledge Management, 2023. [Oral]

Yao K, Su Z, Yang X, et al. Rethinking Data Augmentation for Single-source Domain Generalization in Medical Image Segmentation [C]. AAAI, 2023.

Yao K, Gao P, Yang X, et al. Outpainting by Queries[C]. European Conference on Computer Vision, 2022.

Yao K, Sun J, Huang K, et al. Analyzing cell-scaffold interaction through unsupervised 3d nuclei segmentation[J]. International journal of bioprinting, 2022, 8(1). [SCI Q1, IF 8.4]

Yao K, Su Z, Huang K, et al. A novel 3D unsupervised domain adaptation framework for cross-modality medical image segmentation[J]. IEEE Journal of Biomedical and Health Informatics, 2022. [SCI Q1, IF 7.7]

Yao K, Huang K, Sun J, et al. PointNu-Net: Simultaneous Multi-tissue Histology Nuclei Segmentation and Classification in the Clinical Wild, IEEE Transactions on Emerging Topics in Computational Intelligence, 2023. [SCI Q1, IF: 5.3]

Yao K, Huang K, Sun J, et al. Scaffold-A549: a benchmark 3D fluorescence image dataset for unsupervised nuclei segmentation[J]. Cognitive Computation, 2021, 13(6): 1603-1608. [SCI Q1, IF 5.4]

Yao K, et al. SCMix: Stochastic Compound Mixing for Open Compound Domain Adaptation in Semantic Segmentation[C], Under Review of AAAI

Yao K, et al. TENA: Target-class Expansion and Noise-robust Adaptation for Source-free Universal Domain Adaptation[C], Under Review of AAAI

See full list in Google Scholar.