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.

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

Github
Google Scholar

PROJECT EXPERIENCE

Network Optimization thorugh Regularization in Latent Space 2017.3 - 2018.9
- Used manifold learning principle to reveal the typical neural network's problem.
- Proposed a training strategy, Kernelized Min-Max Objective, to improve the classification performance on deep neural networks.
- Published 2 relating papers during undergraduate.

Deep learning based 3D Cell Culture Analysis 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.
- Explored the potential application of deep learning in laboratory scenario, e.g., drug design, bio-scaffold manufacture, etc.

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

Transfer learning for Domain Generalizable Algorithms 2021.4 - Present
- Proposed 3D unsupervised domain adaptation medical image segmentation framework based on generative adversarial networks.
- Developed unsupervised domain adaptation framework in auto-driving scenario with predictive epistemic uncertainty estimation.
- Investigated domain generalization problem with theoretically supported data augmentation.

WORK EXPERIENCE

Ping An Tech - Data Engineer Intern 2018.11-2019.5
- Handled deep-learning based medical image processing tasks, e.g., segmenting tumor in thyroid ultrasound images.
- Independently developed an annotation software highly customized for doctors, and published two utility model patents.

PUBLICATIONS

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).

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.

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.

Yao K, Huang K, Zhang R, et al. Improving Deep Neural Network Performance with Kernelized Min-Max Objective[C] International Conference on Neural Information Processing. Springer, Cham, 2018: 182-191.

Yao K, Huang K, Sun J, et al. AD-GAN: End-to-end unsupervised nuclei segmentation with aligned disentangling training, Under Review of TNNLS

Yao K, Huang K, Sun J, et al. PointNu-Net: Simultaneous Multi-tissue Histology Nuclei Segmentation and Classification in the Clinical Wild, Under Review of TETCI.

See full list in Google Scholar.