


RENAO YAN

✉ yra21@mails.tsinghua.edu.cn · ☎ (+86) 150-5768-7509 ·  [Google Scholar](#)

EDUCATION

Tsinghua University, China Sep. 2021 – Expected Jun. 2024

Master of Science. Major: Electronic Information. Supervisor: [Tian GUAN](#).

The Hong Kong University of Science and Technology, China Jul. 2023 – Expected Dec. 2023.

Research Assistant. Supervisor: [Hao CHEN](#).

Hunan University, China Sep. 2017 – Jun. 2021

Bachelor of Engineering. Major: Communication Engineering. Supervisor: [Qinghui HONG](#).

Weighted average scores of all courses: 89.65 (ranking: 1/121).

EXPERIENCE

MASTER PERIOD

Project I: Cooperative Game Inspired Progressive Pseudo Bag Augmentation Jul. 2023 – Present

Cooperating Organization: [Smart Lab, UKUST](#).

Brief Introduction: To solve the problem that the attention score fails to accurately locate positive instances, we introduce a metric termed instance importance score, which can be measured by the Shapley value, thereby guiding the progressive assignment of pseudo bags for multiple instance training [6].

Result: We reached the SOTA performance on the WSI classification task for CAMELYON-16 (ACC improving 2.17%), BRACS (3 subtypes, ACC improving 9.9%), and TCGA-LUNG (ACC improving 2.5%) datasets.

Project II: Cerebral Tumor Classification via Whole Slide Images Jan. 2023 – Jun. 2023

Cooperating Organization: [The First Affiliated Hospital, Sun Yat-sen University](#).

Brief Introduction: Employing the proposed hierarchical optimized multiple-instance learning at multiple magnifications, we solved the brain tumor classification task (7 subtypes), satisfying the clinical practice [1].

Result: We developed a new dataset consisting of 2,085 cases and 3,098 WSIs from six hospitals. And we reached the SOTA brain tumor classification with an ACC of 85.60% (improving 5.76%).

Project III: Medical Image Processing using Lightweight Networks Jul. 2022 – Dec. 2022

Brief Introduction: We presented the network similarity-directed initialization to enhance the stability of the neural architecture search. Moreover, the domain adaptation approach was introduced to train a more robust supernet for medical images [8].

Result: We reached the SOTA CNN performance on the BRACS ROI dataset (7 subtypes) with an F1 score of 61.41% (improving at least 1.13% from manually designed CNNs and reducing FLOPs at the same time).

Project IV: Computer Aided Diagnosis of Liver Biopsy Images Jan. 2022 – Jun. 2022

Cooperating Organization: [The Third People's Hospital of Shenzhen](#).

Brief Introduction: We addressed the challenge of converting H&E staining into virtual Masson trichrome staining using liver biopsy unpaired images and minimal annotations [3, 13]. Additionally, we developed a highly effective network for grading nonalcoholic fatty liver disease [12].

Result: Our virtual stained Masson trichrome whole slide images met the needs of the clinical practice. And we reached the SOTA F1 score on the Biopsy4Grading dataset for four different tasks (all improved).

UNDERGRADUATE PERIOD

Project V: Memristive Neural Network Circuit for License Plate Detection Jan. 2021 – Jun. 2021

Brief Introduction: Based on the least mean square algorithm, we have designed a memristive online self-learning neuron circuit. This circuit implementation allows for the realization of single and multi-layer neural networks, enabling their application in pattern recognition and license plate detection [4].

Project VI: Bionic Memristive Circuit Implementation Jun. 2020 – Dec. 2020

Brief Introduction: We proposed a bionic neuron circuit with biological non-associative learning ability. Designed according to the synaptic programming characteristics of the memristor, the circuit can be applied to simulate visual fatigue and automate exposure compensation in cameras [5, 14].

ARTICLE

1. Lianghai Zhu, **Renao Yan**[†], et al. "Hierarchical optimized multiple-instance learning with multiple magnification histological images for cerebral tumor diagnosis." *Journal of Advanced Research (JCR Q1, IF=10.7)* (2023), **under review**.
2. Lianghai Zhu, ..., **Renao Yan**, et al. "An accurate prediction of the origin for bone metastatic cancer using deep learning on digital pathological images." *EBioMedicine (JCR Q1, IF=11.1)* 87 (2023).
3. **Renao Yan**, et al. "Unpaired virtual histological staining using prior-guided generative adversarial networks." *Computerized Medical Imaging and Graphics (JCR Q1, IF=5.7)* 105 (2023): 102185.
4. **Renao Yan**, et al. "Multilayer memristive neural network circuit based on online learning for license plate detection." *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (JCR Q2, IF=2.9)* 41.9 (2021): 3000-3011.
5. Qinghui Hong (Supervisor), **Renao Yan**, et al. "Memristive circuit implementation of biological nonassociative learning mechanism and its applications." *IEEE Transactions on Biomedical Circuits and Systems (JCR Q1, IF=5.1)* 14.5 (2020): 1036-1050.

CONFERENCE

6. **Renao Yan**, et al. "Shapley Values-enabled Progressive Pseudo Bag Augmentation for Whole Slide Image Classification." *Conference on Computer Vision and Pattern Recognition (CVPR)* (2024), **submitted**.
7. Qiehe Sun, **Renao Yan**, et al. "Prior Knowledge as the Catalyst: Transforming Weakly-supervised Slide-level Classification." *Conference on Computer Vision and Pattern Recognition (CVPR)* (2024), **submitted**.
8. **Renao Yan**, et al. "Domain adaptation one-shot neural architecture search with network similarity directed initialization for pathological image classification." *The IEEE International Conference on Multimedia & Expo (ICME)* (2024), **under review**.
9. Xinrui Chen, **Renao Yan**, et al. "HIQ: One-shot quantization for histopathological image classification." *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)* (2024).
10. Xinrui Chen, Yizhi Wang, **Renao Yan**[✉], et al. "TexQ: Zero-shot Network Quantization with Texture Feature Distribution Calibration." *Conference on Neural Information Processing Systems (NeurIPS)* (2023).
11. Xinrui Chen, **Renao Yan**, et al. "ADEQ: Adaptive Diversity Enhancement for Zero-shot Quantization." *The 2023 International Conference on Neural Information Processing (ICONIP)* (2023).
12. **Renao Yan**, et al. "DEST: Deep Enhanced Swin Transformer Toward Better Scoring for NAFLD." *Chinese Conference on Pattern Recognition and Computer Vision* (2022).

PATENT

13. Guangde Zhou, ..., **Renao Yan**. "A method for virtual staining hematoxylin-eosin images into Masson trichrome images.", CN202210635864.5. 2022.
14. Qinghui Hong (Supervisor), **Renao Yan**. "A signal generating device and adjustment method with habituation and sensitization.", CN111291879A. 2020.

HONORS & AWARDS

<i>1st Class Scholarship</i> , Award on Tsinghua University	Oct. 2023
<i>1st Prize</i> , Award on Excellent Paper of the Year in the Major	Oct. 2022
<i>1st Class Scholarship</i> , Award on Tsinghua Shenzhen International Graduate School	Oct. 2022
<i>1st Prize</i> , Award on Undergraduate Excellent Innovative Graduation Project of Hunan University	Jun. 2021
<i>1st Class Scholarship</i> , Award on Hunan University	Oct. 2020
<i>Honorable Mention</i> , Award on the Interdisciplinary Contest in Modeling	Apr. 2020
<i>1st Class Scholarship</i> , Award on Hunan University	Oct. 2019
<i>Merit Student</i> , Award on Hunan University	Oct. 2019
<i>3rd Prize</i> , Award on Mathematics Competition (Non-mathematics Majors) of Hunan University	Jun. 2018

SKILLS AND SERVICE

Language: English (Fluent), Chinese (Native).

Reviewer: IEEE Transactions on Industrial Informatics (JCR Q1, IF=12.3), Chinese Conference on Pattern Recognition and Computer Vision.

Expertise: Multiple Instance Learning (MIL), Generative Adversarial Network (GAN), Neural Architecture Search (NAS), Network Quantization, Pseudo Bag Augmentation, and Memristor Circuit Implementation.

[†]equally contributed.