Yibing Fu

Curriculum Vitae

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Final-year Master student

BIOGRAPHY

2021.9– Present **Master**, *Dept. of Electronic Information Engineering, Beihang University*, C.N.
- Group: Multimedia Computing Towards Communications (MC2) Lab (*See Home Page*)
- Advisor: Prof. Mai Xu (*See Scholar Page*) and Postdoc. Lai Jiang (*See Scholar Page*).
- GPA: 3.74/4.0 Average Grade : 90.5/100 Rank: 2/268

2017.9– 2021.7 **Bachelor**, *Dept. of Electronic Information Engineering, Beihang University*, C.N.
- GPA: 3.73/4.0 Average Grade : 89.2/100 Rank: 3/186

RESEARCH INTERESTS

Medical Image Analysis, Computer Vision, Machine Learning

PUBLICATIONS

[1] **Yibing Fu**, Lai Jiang, Sai Pan, Pu Chen, *et al.* *Deep Multi-task Learning for Nephropathy Diagnosis on Immunofluorescence Images.* Computer Methods and Programs in Biomedicine (**CMPB**, IF=6.1), 2023. (*Paper*)

[2] Sai Pan†, **Yibing Fu**†, Pu Chen, Jiaona Liu, *et al.* *Multi-task learning-based immunofluorescence classification of kidney disease.* International Journal of Environmental Research and Public Health (**IJERPH**), 2021. †Contribute equally as the co-first author. (*Paper*)

[3] **Yibing Fu**, Lai Jiang, Sai Pan, Mai Xu, *et al.* *Coding tree unit partition guided two-stream framework for renal histopathology identification.* Big Task Small Data, 1001-AI, MICCAI 2023 Workshop (**BTSD**), 2023.

[4] Ning Dai, Lai Jiang, **Yibing Fu**, Sai Pan, *et al.* *Recruiting the best teacher modality: A customized knowledge distillation method for IF based nephropathy diagnosis.* International Conference on Medical Image Computing and Computer Assisted Intervention (**MICCAI**), 2023.

[5] Jingyi Xu, Xin Deng, **Yibing Fu**, Shengxi Li, *et al.* *MD-CSC: Exploring Discriminative Convolutional Sparse Coding for Multi-modal Classification.* Under review at Conference and Workshop on Neural Information Processing Systems (**NeurIPS**), 2023.

[6] Sai Pan†, **Yibing Fu**†, Lai Jiang†, Jiaona Liu, *et al.* *A deep sequential neural network for IgA nephropathy histopathology identification and Oxford classification.* Under review at **Science Advances** (IF=13.6). †Contribute equally as the co-first author.

[7] Lai Jiang†, **Yibing Fu**†, Ning Dai, Sai Pan, *et al*. *Explainable Deep Learning for Fine-grained Nephropathy Diagnosis on Immunofluorescence Images.* Under review at Nature Machine Intelligence (**NMI**, IF=23.8). †Contribute equally as the co-first author.

[8] Zheyi Dong, Xiaofei Wang, Sai Pan, Taohan Weng, ..., **Yibing Fu**, Haimei Cheng, *et al*. *Multimodal transformer system for diabetic nephropathy diagnosis based on fundus images.* Under review at Nature Machine Intelligence (**NMI**, IF=23.8).

RESEARCHES

2022.11–Present **Attention mechanism-based Fine-grained Medical Image Classification**[7].

– Supervised by Prof. Mai Xu and Postdoc. Lai Jiang

- Established a large scale database of 6,381 immunofluorescence images for handling the task of distinguishing fine-grained types for nephropathy with the primary/secondary nature.
- Collected attended regions and markers of immunofluorescence sequence during diagnosis via a mouse-contingent experiment.
- Developed an explainable marker-aware attention module to highlight the key pathological areas and markers for diagnosis, which explicitly incorporated the real-world attention from the nephrologists.
- Developed a dual-branch nephropathy diagnosis network and nature-aware contrastive learning strategy, for better distinguishing the primary or secondary nature of the nephropathy.
- Extensive experiments and visualization results demonstrated the superiority and explainability of the proposed method.

2022.3–Present **Sequential Pipeline for Medical Image Segmentation and Classification based on histopathological images** [3][6].

– Supervised by Prof. Mai Xu and Postdoc. Lai Jiang

- Established a large scale database of 296 whole slide images, with 28,970 annotated lesions covering 16 types of fine-grained renal pathological lesions including all types of lesions for gloden Oxford classification evaluation.
- Developed a sequential pipeline, consisting of the lesion segmentation, fine-grained glomerulus classification and multi-label Oxford classification assessment subnets for precisely identifying IgA nephropathy pathological lesions and evaluate the lesions coexisted in the glomeruli in accordance with Oxford classification standard.
- Extensive experiments and visualization results demonstrated the superiority, explainability and generalization ability of the proposed pipeline.
- Attempted to leverage multimedia codec-related information (coding tree unit partition) for boosting renal histopathology identification performance, which provides a new scope of leveraging cross-disciplinary knowledge[3]. Preparing to submit an extended version to IEEE Transactions on Medical Imaging (IEEE TMI).

2020.11–2022.3 **Joint Learning of Multi-level Tasks for Medicalc Image Analysis**[1][2].

– Supervised by Prof. Mai Xu and Postdoc. Lai Jiang

- Established two immunofluorescence image databases with real-world and synthetic blurs and analyze the correlation among multiple tasks.
- The first attempt to solve the problem of disease diagnosis on clinical blurred immunofluorescence images, with a hierarchical multi-task learning framework for the main task of nephropathy diagnosis and the auxiliary tasks of both image quality assessment and de-blurring.
- Developed task-aware losses to build a feedback information flow from the high-level to the low-level tasks, which further boost the diagnosis performance.

SCHOLARSHIP

2019	National Scholarship	***1 time***
2020	National Encouragement Scholarship	***1 time***
2022	Academic Scholarship of Beihang University for master student	*2 times* ***1st Prize***
2022	HaiXin Scholarship	***1 recipient per grade***
2018–2020	Academic Scholarship of Beihang University	*1 time* ***1st Prize*** *&* *2 times* ***2nd Prize***

2019-2020 Academic Competition Scholarship of Beihang University *2 times **1st Prize***

2018–2020 Social Work Scholarship of Beihang University *2 times **1st Prize** & 1 time **2nd Prize***

HONORS & AWARDS

2021 Outstanding Graduate of Beijing City

2018-2022 Merit Student of Beihang University ***4 times***

2019 The 11*th* National College Mathematics Competition ***1st Prize***

2019 The 30*th* Beijing College Mathematics Competition ***1st Prize***

2018 The 35*th* National College Physics Competition Competition ***2nd Prize***

2018 Beijing Area of the National College Mathematical Modeling Competition ***2nd Prize***

2020 "Fengru Cup" Innovation and Entrepreneurship Competition ***1st Prize***

***Top** innovation competition in Beihang University*

2020 Beijing Area of National "Internet plus" Innovation Competition ***3rd Prize***

TEACHING

2021.03–2021.07 **Digital Image Processing**, *Electronic Information Engineering*, Beihang University, China.

- Role: Teaching Assistant
- Lecturers: Prof. Mai Xu

SOFTWARE SKILLS

Programming: Python, Matlab, C, Verilog(Basically)

Platform: Pytorch, OpenCV, Linux, Git, Arduino(Basically), FPGA(Basically)

Doc processing: LaTex, Microsoft Office

English skills: IELTS 6.5