

Xiaofei Wang

Curriculum Vitae

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Second-year Master student



BIOGRAPHY

2021.3– **Research Intern**, Dept. of Computer Science, Johns Hopkins University, U.S.

- Present
- Group: Computational Cognition, Vision, and Learning (CCVL) Lab ([See Home Page](#))
 - Topics: **Interpretable Semantic Segmentation and Compositional Tasking**
 - Advisor: Prof. Alan Yuille ([See Scholar Page](#))

2019.9– **Master**, Dept. of Electronic Information Engineering, Beihang University, C.N.

- Present
- Group: Multimedia Computing Towards Communications (MC2) Lab ([See Home Page](#))
 - Topics:
 - Explainable AI**: Network Visualization, Ad-hoc Interpretability via Convolutional Sparse Coding
 - Multi-Task Learning**: Multi-level Vision Tasks, Joint Segmentation and Classification
 - Medical Image Analysis**: Disease Forecast, Lesion Segmentation and Image Synthesis
 - Advisor: Prof. Mai Xu ([See Scholar Page](#)) and Prof. Zulin Wang

2015.9– **Bachelor**, Dept. of Electronic Information Engineering, Beihang University, C.N.

- 2019.7
- GPA: 3.71/4.0

RESEARCH INTERESTS

Medical Image Analysis, Computer Vision, Machine Learning

PUBLICATIONS

The publications are also listed in my [Google scholar page](#).

- [1] **Xiaofei Wang**, Lai Jiang, Liu Li, Mai Xu, Xin Deng, Lisong Dai, Xiangyang Xu, Pier Luigi Dragotti. *Joint learning of 3D lesion segmentation and classification for explainable COVID-19 diagnosis*. IEEE Transactions on Medical Imaging (**TMI**), 2021 ([Paper](#)) ([Supplementary](#)) ([Code](#)) ([Database](#))
- [2] **Xiaofei Wang**, Mai Xu, Jicong Zhang, Lai Jiang, Liu Li. *Deep Multi-Task Learning for Diabetic Retinopathy Grading in Fundus Images*. AAAI Conference on Artificial Intelligence (**AAAI**), 2021 ([Paper](#)) ([Video](#)) ([Code](#))
- [3] **Xiaofei Wang**[†], Liu Li[†], Mai Xu, Ximeng Chen, Liu Hanruo. *DeepGF: Glaucoma Forecast Using the Sequential Fundus Images*. International Conference on Medical Image Computing and Computer Assisted Intervention (**MICCAI**), 2020. (early accept) [†]Contribute equally as the co-first author. ([Paper](#)) ([Supplementary](#)) ([Code](#)) ([Database](#))
- [4] **Xiaofei Wang**, Mai Xu, Liu Li, Zulin Wang, Zhenyu Guan. *Pathology-aware deep network visualization and its application in glaucoma image synthesis*. International Conference on Medical Image Computing and Computer Assisted Intervention (**MICCAI**), 2019. ([Paper](#)) ([Code](#))

- [5] Lai Jiang, Mai Xu, **Xiaofei Wang**, Leonid Sigal. *Saliency-Guided Image Translation*. IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**), 2021 (*Paper*) (*Supplementary*)
- [6] Liu Li, Mai Xu, **Xiaofei Wang**, Lai Jiang, Hanruo Liu. *Attention based glaucoma detection: A large-scale database and CNN Model*. IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**), 2019 (*Paper*) (*Database*)
- [7] Liu Li, Mai Xu, Hanruo Liu, Yang Li, **Xiaofei Wang**, Lai Jiang, Zulin Wang, Xiang Fan, Ningli Wang. *A Large-Scale Database and a CNN Model for Attention-Based Glaucoma Detection*. IEEE Transactions on Medical Imaging (**TMI**), 2020 (*Paper*) (*Database*)

PAPERS UNDER REVIEW

- [8] **Xiaofei Wang**, Mai Xu, Jicong Zhang, Lai Jiang, Liu Li, Ningli Wang, Hanruo Liu, Zulin Wang. *Joint Learning of Multi-level Tasks for Diabetic Retinopathy Grading*. (*Paper*) IEEE journal of Biomedical And Health Informatics (**JBHI**, Major Revision).
- [9] **Xiaofei Wang**[†], Yibing Fu[†], Sai Pan, Mai Xu. *Deep Multi-task Learning for Nephropathy Diagnosis on Immunofluorescence Images*. Under review. [†]Contribute equally as the co-first author.

RESEARCHES

Researches on Interpretable Neural Network

- 2021.3–
Present **Convolutional Sparse Coding for Interpretable Semantic Segmentation**.
– Supervised by Prof. Alan Yuille.
○ Motivation:
– Designing an interpretable, robust and light-weight semantic segmentation framework via convolutional sparse coding and deep unfolding based algorithms ;
– First attempt to develop a deep interpretable model for medical image segmentation, especially for the problem of multi-organ segmentation using multiple partially labeled dataset;
- 2018.7–
2019.4 **Network Visualization and its Application in Medical Image Synthesis** *1st Author* .
(*Paper: MICCAI 2019*)
– Supervised by Prof. Mai Xu
○ Main works:
– Proposed a pathology-aware visualization approach for explaining the decision of DNN-based networks;
– Synthesized glaucoma fundus images with the proposed Patho-GAN utilizing the visualization maps, which can be used as an unsupervised data augmentation method.
○ In experiments, the proposed Patho-GAN model advances the task of glaucoma image synthesis significantly.

Researches on Multi-task Learning

- 2020.4–
2021.2 **Joint Learning of 3D Lesion Segmentation and Disease Classification** *1st Author* .
(*Paper: TMI 2021*)
– Supervised by Prof. Mai Xu and Prof. Xin Deng
○ Main works:
– The first attempt in joint learning of 3D lesion segmentation and disease classification based on 3D CT scans;
– Established a large scale database of CT scans, with fine-grained lesion annotations, for the diagnosis of COVID-19 and CAP;
– Proposed an explainable deep multi-task learning model for both tasks of 3D lesion segmentation and disease classification of COVID-19.
○ Extensive experiments verify that our method achieves excellent performance in 3D lesion segmentation and disease classification for COVID-19 diagnosis.

- 2019.7– **Joint Learning of Multi-level Vision Tasks for Medical Image Analysis**
 2020.4 (*Paper: AAAI 2021*) **1st Author** .
- Supervised by Prof. Mai Xu
 - Main works:
 - The first attempt to perform multiple medical tasks at low, mid and high-levels simultaneously.
 - Analyzed the correlation among the tasks of ISR, lesion segmentation and DR grading;
 - Proposed a deep multi-task learning method for the main task of DR grading and the auxiliary tasks of both ISR and lesion segmentation
 - Extensive experiments verify that our method achieves excellent performance in DR grading, ISR and lesion segmentation.

Researches on Disease Diagnosis and Forecast

- 2019.2– **Dynamic Model for Disease Forecast** (*Paper: MICCAI 2020*) **1st Author** .
 2019.7 – Supervised by Prof. Mai Xu
- Main works:
 - Established a sequential fundus image database for glaucoma fore- cast;
 - Proposed a variable time interval CNN+LSTM model based on the sequential samples;
 - Introduced a active convergence training strategy for the imbalanced distribution problem.
 - In experiments, the proposed DeepGF model advances the task of glaucoma forecast significantly.
- 2018.4– **Attention Mechanism-based Medical Image Detection and Visualization**
 2019.1 (*Paper: CVPR 2019*) **3rd Author** (*Paper: TMI 2020*) **5th Author** .
- Supervised by Prof. Mai Xu
 - Main works:
 - Proposed an attention-based CNN model for glaucoma detection;
 - Visualized the pathological regions on the fundus images by guided-bp method;
 - Embedded weakly supervised learning method motivated by the rotation invariance.
 - In experiments, the proposed attention-based CNN model advances multiple tasks (including glaucoma detection and attention prediction) significantly.

Researches on Image-to-Image Translation

- 2019.9– **Saliency-Guided Image Translation** (*Paper: CVPR 2021*) **3rd Author** .
 2020.10 – Supervised by Prof. Mai Xu
- Main works:
 - Propose a novel task for saliency-guided image translation, with the goal of image-to-image translation conditioned on the user specified saliency map;
 - Developed a novel Generative Adversarial Network (GAN)-based model to generate a translated image that satisfies the target saliency map;
 - Built a synthetic dataset and a real-world dataset with labeled visual attention for training and evaluating our SaIG-GAN.
 - The experimental results over both datasets verify the effectiveness of our model for saliency-guided image translation.

HONORS & AWARDS

The most representative 4 honors:

- MICCAI 2019 Undergraduate Student Travel Award
- First Class of Academic Competition Scholarship of Beihang University
- First Prize in 11th National College Students Information Security Competition
- First Prize in 8th Beijing undergraduate IC Design Competition

Other 6 awards, including:

- Outstanding Graduate Student of Beihang University
- Honorable Winner in 34th COMAP's Mathematical Contest in Modeling
- Second Prize in 27th Beijing University Mathematics Competition
- Second Prize in 28th Beijing University Mathematics Competition
- Second Prize in 9th "Blue Bridge Cup" Programming Contest

- Second Prize in National College Students Electronic Design Competition in 2017

TEACHING

2020 **Digital Image Processing**, *Department of Computer Science*, Beihang University, China.

- Role: Teaching Assistant & Tutor

- Lecturers:

- Prof. Mai Xu ([See Home Page](#))