

# 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 Medical Image Segmentation**
  - 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**) (IF=10.048), 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**<sup>†</sup>, Liu Li<sup>†</sup>, 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) <sup>†</sup>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**<sup>†</sup>, Yibing Fu<sup>†</sup>, Sai Pan, Mai Xu. *Deep Multi-task Learning for Nephropathy Diagnosis on Immunofluorescence Images*. Under review. <sup>†</sup>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 forecast;  
 – 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 11<sup>th</sup> National College Students Information Security Competition
- First Prize in 8<sup>th</sup> Beijing undergraduate IC Design Competition

### Other 6 awards, including:

- Outstanding Graduate Student of Beihang University
- Honorable Winner in 34<sup>th</sup> COMAP's Mathematical Contest in Modeling
- Second Prize in 27<sup>th</sup> Beijing University Mathematics Competition
- Second Prize in 28<sup>th</sup> Beijing University Mathematics Competition
- Second Prize in 9<sup>th</sup> "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](#))