Xiaofei Wang

Curriculum Vitae

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Second-year Master student

BIOGRAPHY

2021.3– Present
Research Intern, *Dept. of Computer Science, Johns Hopkins University*, U.S.
- Group: Computational Cognition, Vision, and Learning (CCVL) Lab
- Topics: **Interpretable Medical Image Segmentation**
- Advisor: Prof. Alan Yuille

2019.9– Present
Master, *Dept. of Electronic Information Engeneering, Beihang University*, C.N.
- Group: Multimedia Computing Towards Communications (MC2) Lab
- 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 and Prof. Zulin Wang

2015.9– 2019.7
Bachelor, *Dept. of Electronic Information Engeneering, Beihang University*, C.N.
- 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**†, 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] **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 Under review of IEEE JBHI, Major Revision.

[6] Yibing Fu†, **Xiaofei Wang**†, Sai Pan, Mai Xu. *Deep Multi-task Learning for Nephropathy Diagnosis on Immunofluorescence Images.* Under review of AAAI. †Contribute equally as the co-first author.

[7] Lai Jiang, Mai Xu, **Xiaofei Wang**, Leonid Sigal. *Saliency-Guided Image Translation.* IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**), 2021 (*Paper*) (*Supplementary*)

[8] 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*)

[9] 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*)

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 algrithms ;
  - 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 (*Paper: MICCAI 2019*)** ***1st Author*** .

– *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 (*Paper: TMI 2021*)** ***1st Author*** .

– *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 SalG-GAN.
- The experimental results over both datasets verify the effectiveness of our model for saliency-guided image translation.

SCHOLARSHIPS

2021 National Scholarship

Directly *awarded by the National Ministry of Education*

2018 First Prize of Academic Competition Scholarship of Beihang University ***2st Prize***

2018 First Prize of Science and Technology Scholarship of Beihang University ***1st Prize***

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^{th} National College Students Information Security Competition

- First Prize in 8^{th} Beijing undergraduate IC Design Competition

Other 6 awards, including:

- Outstanding Graduate Student of Beihang University
- Honorable Winner in 34^{th} COMAP's Mathematical Contest in Modeling
- Second Prize in 27^{th} Beijing University Mathematics Competition
- Second Prize in 28^{th} Beijing University Mathematics Competition
- Second Prize in 9^{th} "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*)

SKILLS

Programming: C, C++, Matlab, Python

Platform: Tensorflow, Pytorch, Linux

Word processing: LaTeX, Microsoft Office, Adobe Illustrator

English: CET-6 568