ZIYUN YANG

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EDUCATION

Duke University — Durham, NC

- PhD Candidate in Biomedical Engineering, GPA: 3.96/4.00 — *Expected 09/2024*
- Advisor: Prof. **Sina Farsiu**

Beijing Institute of Technology (BIT) — Beijing, China

- Bachelor of Automation Engineering — *9/2015 - 6/2019*
- Thesis title: Multimodal Neural Network for Data Fusion in Image Classification

RELEVANT SKILLS

- **Programming / Software**: Python (including PyTorch, Tensorflow, NumPy, SciPy, pandas, OpenCV, etc.), MATLAB, C, C++, Verilog, Latex, Git.
- **Professional Keywords**: Machine Learning, Deep Learning, Computer Vision, Statistics, Biomedical Imaging, Salient Object Detection, Image Segmentation, Medical Image Analysis, Medical Imaging, Image Synthesis, Image Restoration, Representation Learning, Generative Learning, Image Topology, Digital Signal Processing.

INDUSTRY EXPERIENCE

Meta Reality Labs | Eye Tracking Research Team — Redmond, WA

Research Scientist Intern – Computer Vision & 3D Reconstruction — *05/2023 – 08/2023*

- Developed segmentation and registration algorithms for improving 3D reconstruction for eye tracking research in a multi-disciplinary team.
- Developed software and algorithms to expand the FOV of the 3D reconstructed images using ML and helped with the calibration process for eye tracking research.

SELECTED PUBLICATION

- **Z. Yang**, M. Niziol, Y. Wang, M. Pawar, L. A. Lu, M. A. Woodward, and S. Farsiu, "A Self-Knowledge Distillation-Empowered Directional Connectivity Transformer for Microbial Keratitis Biomarkers Segmentation on Slit-Lamp Photography", IEEE TMI (under review), 2024.
- **Z. Yang,** K. Choy, and S. Farsiu, "Spatial Coherence Loss for Salient and Camouflaged Object Detection and Beyond", in *CVPR* 2024 (under review).
- **Z. Yang** and S. Farsiu, "Directional Connectivity-based Segmentation of Medical Images", in *CVPR,* 2023, pp. 2774-2784.
- **Z. Yang**, S. Soltanian-Zadeh, S. Farsiu, "BiconNet: An Edge-preserved Connectivity-based Approach for Salient Object Detection," *Pattern Recognit.,* vol. 121, p. 108231, 2022.
- R. Rasti, A. Biglari; M. Rezapourian; **Z. Yang**; and S. Farsiu, "RetiFluidNet: A Self-Adaptive and Multi-Attention Deep Convolutional Network for Retinal OCT Fluid Segmentation", *IEEE Trans. Med. Imag.*, vol. 42, no. 5, pp. 1413-1423, 2023.
- **Z. Yang,** S. Soltanian-Zadeh, K. K. Chu, H. Zhang, L. Moussa, A. E. Watts, N. J. Shaheen, A. Wax, and S. Farsiu, "Connectivity-based Deep Learning Approach for Segmentation of the Epithelium in In Vivo Human Esophageal OCT Images," *Biomed. Opt. Exp.,* vol. 12, no. 10, pp. 6326-6340, 2021.
- G. Song., Z.A. Steelman, S. Finkelstein, **Z. Yang**, et al. "Multimodal Coherent Imaging of Retinal Biomarkers of Alzheimer's Disease in a Mouse Model". Sci Rep 10, 7912 (2020).
- F. Mahmood, **Z. Yang**, R. Chen, D. Borders, W. Xu, N. J. Durr. "Polyp Segmentation and Classification using Predicted Depth from Monocular Endoscopy," *Proc. SPIE* **10950**, 1095011, 2019.
- F. Mahmood, J. Johnson, **Z. Yang**, N. J. Durr, "Fusing Attributes Predicted via Conditional GANs for Improved Skin Lesion Classification," *Proc. SPIE* **10950**, 109501T, 2019.

- F. Mahmood, **Z. Yang**, T. Ashley, N. J. Durr, "Multimodal Densenet," *arXiv:1811.07407*, 2018.

RELATED RESEARCH EXPERIENCE

Duke VIP Lab | Connectivity-based DL Framework for Image Segmentation and Detection   Durham, NC

Supervisor: Dr. Sina Farsiu   *3/2020 - Present*

- Proposed a connectivity-based deep learning framework for image analysis; validated its superiority on **salient object detection** task by conducting experiments on 5 public datasets and presented the state-of-the-art (SOTA) results on different metrics.
- Reduced common geometrical/topological issues in **medical segmentation** with connectivity modeling on endoscopic, dermoscopic, and ophthalmological images; significantly ($p<0.05$) outperformed SOTA models.
- Processed and cleaned the clinical data; conducted statistical analysis on extracted biomarkers; demonstrated the clinical potential of connectivity-based segmentation in detecting Barrett's esophagus and Alzheimer's Disease.

Duke VIP Lab | Mutual-relation-aware Loss Design and Modeling for Image Segmentation   Durham, NC

Supervisor: Dr. Sina Farsiu   *10/2022 - Present*

- Mathematically designed a novel loss function to model the mutual impacts between neighboring pixels in an image.
- Implemented the proposed loss in Python as an easy-to-use package for deep learning models.
- Improved the SOTA results of different tasks, including salient object detection and semantic segmentation.

Duke VIP Lab | Latent Representation Learning for Biomedical Segmentation   Durham, NC

Supervisor: Dr. Sina Farsiu   *01/2022 – 09/2022*

- Disentangled directional sub-space in latent space of the connectivity-based segmentation network and visualized the decoupled latent space using T-SNE.
- Proposed a model and implemented it in Pytorch from scratch to enhance the directional feature representation in a connectivity-based segmentation network; achieved SOTA result on a public retinal fluid dataset (Retouch), retinal vessel dataset (CHASEDB1), and a skin lesion dataset (ISIC2018).

Duke VIP Lab | Blind Image Denoising Using Nested GAN-DnCNN   Durham, NC

Supervisor: Dr. Tarokh Vahid & Dr. Sina Farsiu   *11/2019 - 01/2020*

- Synthesized the real-world noises by iterative training WGAN-GP.
- Implemented blind image denoising by training a supervised denoising network with the synthetic noise samples; achieved an average PSNR of 28.8.

JHU Durr Lab| Reverse Adversarial Image Synthesis for RGB-D Polyp Detection.   Baltimore, MD

Supervisor: Dr. Faisal Mahmood   *07/2018 - 11/2018*

- Generated synthetic depth and narrow bounding images by reverse adversarial training.
- Achieve SOTA results with RGB-D polyp segmentation using the synthetic depth images with a 98% accuracy on 4 public datasets and an 87.24% accuracy on lesion classification.
- Applied CNN visualization tools (e.g., Grad-CAM) to different trained networks. Visually demonstrated the efficiency of synthetic data fusion in endoscopy classification tasks.

JHU Durr Lab| Multimodal DenseNet for RGB-D Image Classification.   Baltimore, MD

Supervisor: Dr. Faisal Mahmood   *07/2018 - 11/2018*

- Proposed a new multimodal network called Multimodal DenseNet which is capable of fusing information from multiple imaging modalities (RGB, depth, etc.).
- Analyzed and benchmarked the proposed model with existing multimodal architectures; presented the SOTA results for lesion classification and anatomical landmark identification in colonoscopy.

SELECTED HONORS & AWARDS

- Research to Prevent Blindness Small Grant Award, Duke University Eye Center. *4/2021-9/2021*
- The John Strohbehn Fellowship, Duke Biomedical Engineering Department. *8/2020-8/2021*
- Excellent Undergraduate Student, China Scholarship Council. *3/2018*

ACADEMIC SERVICE & TEACHING EXPERIENCE

- Ad-Hoc Reviewer - *Biomedical Express*, *Scientific Report, WACV, and ECCV*
- Head Graduate Teaching Assistant - Digital Image Processing, Intro to Deep Learning

LEADERSHIP

- Excellent Prudential Management Intern (Hong Kong, 2017)
- Chairman of BIT Model United Nation (Beijing, 2016 - 2019)