ZIYUN YANG

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EDUCATION

Duke University   Durham, NC

- PhD Candidate in Biomedical Engineering, GPA: 3.96/4.00   *Expected 09/2024*
- Concentration: Computer Vision & Machine Learning
- Advisor: Prof. Sina Farsiu

Beijing Institute of Technology (BIT)   Beijing, China

- Bachelor of Science in 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, Saliency Detection, Camouflaged Object Detection, Medical Image Analysis, Image Segmentation, Eye Tracking, Image Synthesis, Image Restoration, Representation Learning, Generative Learning, Image Topology, Digital Signal Processing, Biomedical Imaging.

INDUSTRY EXPERIENCE

Meta Reality Labs | Eye Tracking Research Team   Redmond, WA

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

- Developed segmentation and registration algorithms for improving 3D reconstruction for eye tracking research.
- Proposed and employed algorithm in calculating the eye biometry for future VR/AR.
- Developed software and algorithms to expand the FOV of the 3D reconstructed images using ML and helped with the hardware calibration process for eye tracking research.

SELECTED PUBLICATION

- **Z. Yang** and S. Farsiu, "Directional Connectivity-based Segmentation of Medical Images", in ***CVPR,*** 2023, pp. 2774-2784.
- **Z. Yang,** K. Choy, and S. Farsiu, "Spatial Coherence Loss for Salient and Camouflaged Object Detection and Beyond", *arXiv*:2402.18698, 2024.
- **Z. Yang**, et al., "A Self-Knowledge Distillation-Empowered Directional Connectivity Transformer for Microbial Keratitis Biomarkers Segmentation on Slit-Lamp Photography", ***IEEE Trans. Med. Imag.*** (under review), 2024.
- **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, 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 Beyond   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 and medical image segmentation and presented the state-of-the-art (SOTA) results on different metrics.
- Reduced common topological issues in medical segmentation with connectivity modeling on endoscopic, dermoscopic, and ophthalmological images; significantly ($p<0.05$) outperformed SOTA models; demonstrated the clinical potential of connectivity-based method in detecting Barrett's esophagus, Microbial Keratitis, and Alzheimer's Disease etc.
- Currently focusing on utilizing connectivity in Diffusion models for image super resolution.

Duke VIP Lab | Mutual-relation-aware Loss for Salient and Camouflaged Object Detection   Durham, NC

Supervisor: Dr. Sina Farsiu   *10/2022 – 12/2023*

- Designed a novel loss scheme to model the mutual impacts between neighboring pixels in an image and implemented the proposed loss in Pytorch as an easy-to-use package for deep learning models.
- Improved the SOTA results of different tasks, including salient object detection and camouflaged object detection.

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 to enhance the directional feature representation in a connectivity-based segmentation network; achieved SOTA results on different tasks including retinal fluid, retinal vessel, and skin lesion dataset segmentation.

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 synthetic noise samples.

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 synthetic depth images with a 98% accuracy on 4 public datasets and an 87.24% accuracy on lesion classification.
- Proposed a new multimodal network to fuse information from multiple imaging modalities (RGB, depth, etc.).

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*

ACADEMIC SERVICE & TEACHING EXPERIENCE

- 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)