BIN WANG

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EDUCATION

Northwestern University — Illinois, USA
Ph.D. student in Electrical and Computer Engineering, advisor: Prof. Ulas Bagci — Sept. 2022 – Present

ShanghaiTech University — Shanghai, China
B.E. in Computer Science and Technology, advisor: Prof. Dinggang Shen — Sept. 2018 – Jun. 2022

RESEARCH INTERESTS

Human-centered AI: interactive segmentation, tracking, editing (image/video), user prompt fusion.
Eye Tracking: human visual attention and perception understanding.
Multimodal Learning: vision-language models for medical image analysis, multimodal fusion.

INDUSTY EXPERIENCE

United Imaging Intelligence - America — Boston, MA
Computer Vision Research Intern, advised by Dr. Ziyan Wu — Jun. 2024 – Sep. 2024

- Develop a novel interactive segmentation algorithm that explicitly incorporates missing relative depth information, establishing a new state-of-the-art for 2D interactive segmentation task.

SELECTED PUBLICATIONS (*: CONTRIBUTE EQUALLY)

[1] **Bin Wang**, Anwesa Choudhuri, Meng Zheng, Zhongpai Gao, Benjamin Planche, Andong Deng, Qin Liu, Terrence Chen, Ulas Bagci, Ziyan Wu. Order-aware Interactive Segmentation. **(Under Review, 2024)**

[2] **Bin Wang**, Hongyi Pan, Armstrong Aboah, Zheyuan Zhang, Ulas Bagci. GazeGNN: A Gaze-Guided Graph Neural Network for Chest X-ray Classification. **(WACV, 2024; Early Accept)**

[3] **Bin Wang***, Lin Teng*, Xuanang Xu*, Jiadong Zhang, Lanzhuju Mei, Qianjin Feng, Dinggang Shen. Beam-wise Dose Composition Learning for Head and Neck Cancer Dose Prediction in Radiotherapy. **(Medical Image Analysis, 2024)**

[4] **Bin Wang**, Armstrong Aboah, Zheyuan Zhang, Hongyi Pan, Ulas Bagci. GazeSAM: Interactive Image Segmentation with Eye Gaze and Segment Anything Model. **(NeurIPS Workshop, 2023)**

[5] **Bin Wang**, Lin Teng, Lanzhuju Mei, Zhiming Cui, Xuanang Xu, Dinggang Shen. Deep Learning-Based Head and Neck Radiotherapy Planning Dose Prediction via Beam-wise Dose Decomposition. **(MICCAI, 2022)**

[6] **Bin Wang**, Huanyu Zhang, Ziping Zhao, Ying Sun. Globally Convergent Algorithms for Learning Multivariate Generalized Gaussian Distributions. **(IEEE Statistical Signal Processing (SSP), 2021)**

[7] Hongyi Pan, **Bin Wang**, Zheyuan Zhang, Xin Zhu, Debesh Jha, Ahmet Enis Cetin, Concetto Spampinato, Ulas Bagci. Domain Generalization with Fourier Transform and Soft Thresholding. **(ICASSP, 2024)**

[8] Zheyuan Zhang, **Bin Wang**, Debesh Jha, Ugur Demir, Ulas Bagci. Domain Generalization with Correlated Style Uncertainty. **(WACV, 2024; Early Accept)**

[9] Armstrong Aboah, **Bin Wang**, Ulas Bagci, Yaw Adu-Gyamfi. Real-time Multi-class Helmet Violation Detection Using Few-Shot Data Sampling Technique and YOLOv8. **(CVPR, 2023; 7th place in 2023 AI City Challenge)**

[10] Zheyuan Zhang, Lanhong Yao, **Bin Wang**, Debesh Jha, Elif Keles, Alpay Medetalibeyoglu, Ulas Bagci. EMIT-Diff: Enhancing Medical Image Segmentation via Text-Guided Diffusion Model. **(TMI Under Review, 2023)**

Research Experience

[1] Interactive 2D Image Segmentation

- We propose OIS: order-aware interactive segmentation, to explicitly integrate missing relative depth information into 2D interactive segmentation, which improves the model's ability to distinguish objects based on their relative depths from each other.

Keywords: Interactive Segmentation, Prompt Learning

[2] Eye-Tracking based Segmentation

- We propose a novel interactive image segmentation system that utilizes Segment Anything Model (SAM) with eye gaze as the interactive prompt instead of the mouse-based interaction. It enhances the annotation workflow efficiency by nearly 50%.

Keywords: Eye Tracking, Foundational Model, Prompt-guided Segmentation, Human-In-The-Loop

[3] Medical Image Segmentation via Text-Guided Diffusion Model

- We propose a novel approach for generating high-quality synthetic medical images using diffusion probabilistic models with text and edge constraint. It achieves the first successful application of text-guided diffusion models to general medical image segmentation tasks.

Keywords: Text-guided Image Generation, Generative Model

[4] Disease Classification via Gaze-Guided Graph Neural Network

- We propose a novel gaze-guided graph neural network that integrates raw eye-gaze data directly into image classification, enabling real-time disease classification for radiologists and demonstrating the practicality of real-time eye tracking in their daily work.

Keywords: Image Classification, Graph Neural Network, Human-In-The-Loop

[5] Dose Prediction via Beam-wise Dose Composition Learning

- We predict dose map in radiotherapy by utilizing proposed innovative beam masks to decompose the dose map into multiple beam-based sub-fractions, which disassembles the difficult task to a few easy-to-learn tasks. It achieves top-1 rank on OpenKBP challenge.

Keywords: Radiotherapy, Coarse-to-fine Model

Technical Skills

Languages & Software: Python, Matlab, SQL, C/C++, Diffuser, ITK-SNAP, 3D-Slicer, Optitrack.

Data Science & Computer Vision Toolkits: Pytorch, TensorFlow, OpenCV, PIL, Scikit-Image, Sklearn, Matplotlib, SimpleITK, Numpy, Pandas.

Interface Development Toolkits: PyQt5, QtDesigner.