

# BIN WANG

(+1) 773-290-4577 | bin.wang@northwestern.edu | <https://ukaukaaaa.github.io/>

## 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.

## INDUSTRY EXPERIENCE

### United Imaging Intelligence - America

Boston, MA

Computer Vision Research Intern, advised by Dr. Ziyang 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, Ziyang 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, Lanzhu 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, Lanzhu 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] Shaoyuan Wu, Xiao Zhang, **Bin Wang**, Zhuo Jin, Hansheng Li, Jun Feng. Gaze-directed Vision GNN for Mitigating Shortcut Learning in Medical Image. (**MICCAI, 2024**)
- [8] 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**)
- [9] Zheyuan Zhang, **Bin Wang**, Debesh Jha, Ugur Demir, Ulas Bagci. Domain Generalization with Correlated Style Uncertainty. (**WACV, 2024; Early Accept**)
- [10] 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**)

[11] 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

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### [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

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**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.