Yuexi Du

Biomedical Engineering :: Computer Vision :: Medical Image Analysis

111 Park St. New Haven. United States

:: ☐ (+1) 734-604-4399 :: ✉ yuexi.du@yale.edu :: 🏠 xypb.github.io ::

EDUCATION

Yale University, New Haven, U.S.   *Sept. 2022 – Present*
- **Ph.D.**, Biomedical Engineering, Medical Image Analysis
- **M.S. w/ Honor** (En Route) Obtained in *Dec. 2023*
- Advised by *Prof. Nicha C. Dvornek*.

University of Michigan, Ann Arbor, U.S.   *Sept. 2020 – May. 2022*
- **B.S.**, Computer Science, w/ Mathematics Minor, **GPA: 3.97/4.00**
- Course Work: *Intro. to Computer Organization* (**A+**), *Computer Vision* (**A+**), *Adv. Topic in CV* (**A+**)

Shanghai Jiao Tong University, Shanghai, China   *Sept. 2018 – Aug. 2022*
- **B.S.**, Electrical Computer Engineering, **GPA: 3.70/4.00 (Top 10%)**
- Course Work: *Programming and Data Structures* (**A+**), *Honors Mathematics IV* (**A+**)

SELECTED PUBLICATIONS

[1] **Yuexi Du**, Lihui Chen, Nicha C. Dvornek. *"Geometry-Guided Local Alignment for Multi-View Visual Language Pre-Training in Mammography."* **MICCAI 2025**. [Paper]

[2] **Yuexi Du**, Nicha C. Dvornek, John Onofrey. *"GMR-Conv: An Efficient Rotation and Reflection Equivariant Convolution Kernel Using Gaussian Mixture Rings." (in submission)*. [Paper]

[3] **Yuexi Du**, John Onofrey, Nicha C. Dvornek. *"Multi-View and Multi-Scale Alignment for Contrastive Language-Image Pre-training in Mammography."* **IPMI 2025, _Best Paper Runner-up_, Oral Presentation**. [Paper]

[4] **Yuexi Du**, Jiazhen Zhang, Tal Zeevi, Nicha Dvornek, John Onofrey *"SRE-Conv: Symmetric Rotation Equivariant Convolution for Biomedical Image Classification."* **IEEE ISBI 2025**. [Paper]

[5] **Yuexi Du**, Brian Chang, Nicha C. Dvornek. *"CLEFT: Language-Image Contrastive Learning with Efficient Large Language Model and Prompt Fine-Tuning."* **MICCAI 2024**. [Paper]

[6] **Yuexi Du**, Regina J. Hooley, John Lewin, Nicha C. Dvornek. *"SIFT-DBT: Self-supervised Initialization and Fine-Tuning for Imbalanced Digital Breast Tomosynthesis Image Classification."* **IEEE ISBI 2024**. [Paper]

[7] **Yuexi Du**, Ziyang Chen, Justin Salamon, Bryan Russell, Andrew Owens. *"Conditional Generation of Audio from Video via Foley Analogies."* **CVPR 2023**. [Project page][Paper]

[8] Xiyue Wang, **Yuexi Du**, Sen Yang, Jun Zhang, Minghui Wang, Jing Zhang, Wei Yang, Junzhou Huang, Xiao Han, *"RetCCL: Clustering-guided contrastive learning for whole-slide image retrieval"*. **Medical Image Analysis**, Volume 83, 2023, 102645, ISSN 1361-8415. [Paper]

INDUSTRY EXPERIENCE

Clinically Accountable Multi-modal Medical Visual Reasoning Agent   *Mentored by Dr. Jinglu Wang*
Media Compute Group @ Microsoft Research Asia   *May 2025 – Sept. 2025*
- ***Objective:*** Research on accountable medical VLA supported by reasoning and visual evidence.
- ***Method:*** We proposed an accountable medical VLA framework that decomposes medical VQA into: (i) medical-entity proposal (VLM, RLVR-tuned), (ii) referring segmentation (pixel-level ROI), and (iii) evidence-grounded VQA that consumes the full image plus one of three "visual clues" (zoom-in, mask, or global indicator). We proposed both static workflow model with rule-based answer aggregation using different supporting evidence, and an agentic framework with dynamic coordinator that plans tool invocations while reviewing answer-reasoning consistency.
- ***Outcome:*** Our method claimed 10.9% improvement against same-size 10B state-of-the-art model. It further surpasses a heavily pre-trained 32B baseline by 5.2% on multiple public medical VQA benchmarks.

Content Based Pathological Image Retrieval System   *Mentored by Dr. Xiao Han & M.S. Sen Yang*
AI Health Care Group @ Tencent AI Lab   *May 2021 – Sept. 2021*
- ***Objective:*** Research on unsupervised contrastive learning and CBIR system for pathological WSI.
- ***Method:*** Introduce a periodical moving average clustering guided module to reduce the number of false negatives in image contrastive learning. Develop a high-speed content-based image retrieval system based on the most representative WSI patches selected according to feature clustering. Applying the pre-trained image encoder to different downstream classification tasks.
- ***Outcome:*** On TCGA WSI retrieval task for primary site of disease and patient level diagnoses test, beats Yottixel & FISH by more than 10% in terms of average mean Majority Vote score. The pre-trained model outperforms baselines by more than 5% on TCGA lung cancer patch classification.

RESEARCH EXPERIENCE

Multi-Modal Representation Learning for Medical Image   *Advised by Nicha C. Dvornek*
IPAG @ Yale   *June. 2023 – Present*
- ***Objective:*** Enhance medical image representation learning using multi-modal information and LLM.

- **Method:** Introduce multi-view and multi-scale contrastive language-image pre-training to medical image representation learning using corresponding tabular data or free text reports. Using multi-view contrastive learning to adapt the multi-view nature of chest X-ray and Mammography. Proposed a local alignment module to improve the fine-grained understanding of the image and provide interpretability to the model output.
- **Outcome:** The proposed method is one of the first CLIP models specifically designed for mammography and beats existing baselines by 4% on the EMBED dataset. Our proposed method ranked **#1** for the gold standard evaluation task and was recognized as the **overall best solution** in the *CXR-LT Challenge@MICCAI 24*.

Controlled and Self-supervised Diffusion MRI Denoising via Diffusion
Yale University　　　　　　　　　　　　　　　　　　　　　*Advised by Andre Wibisono*
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- **Objective:** Reduce the uncontrolled deformation of diffusion model-based MRI image denoising process.
- **Responsibility:** Introduce a controlled frozen encoder and decoder with zero-convolution to attention-based diffusion UNet. Use the DDIM diffusion process to reduce the uncertainty during the long diffusion process. Implement the model and experiment with multiple real-world diffusion MRI datasets.
- **Outcome:** Greatly improve the SSIM of denoised MRI by more than 10% on both datasets. Also improves the downstream task performance for CSD modeling and DTI modeling. [Report]

Rotation & Reflection Equivariant CNN Architecture
IPAG @ Yale　　　　　　　　　　　　　　　　　　　　　*Advised by John Onofrey*
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- **Objective:** Develop an efficient rotation & reflection equivariant convolution layer to serve as a vision encoder for images without specific orientation, e.g., pathological images and remote-sensing images.
- **Method:** Design a smoothed symmetric convolution kernel to extract local rotation & reflection invariant features. Due to the translation invariance of convolution operation, the global feature map will be rotation & reflection equivariant. We also proposed a time- & space-efficient implementation that reduces the computational complexity and parameter number of the R2E2 convolutional layers.
- **Outcome:** The proposed method shows SOTA performance on multiple classification benchmarks from pathological images to remote sensing data. The model also shows the best consistency under rotation and reflection augmentation compared with group-based methods.

TEACHING EXPERIENCE

ENAS 912: Biomedical Image Processing, TF | Yale	*Prof. James Duncan & Prof. Lawrence Staib*
Hold weekly Office Hour & Homework Grading & Hold Review Session	*Sept. 2023 – Dec. 2023*
EECS 442: Computer Vision, IA | UMich	*Prof. David Fouhey*
Hold weekly Office Hour & Design homework and projects & Manage Piazza	*Jan. 2022 – April. 2022*
VR 246: Intro to Comics & Graphic Novels, TA | SJTU	*Prof. Joelle Tybon*
Hold weekly Office Hour & Grading	*May. 2021 – Aug. 2021*
VE101: Intro to Computer & Programming, TA | SJTU	*Prof. Jigang Wu*
Leading Review Class & Office Hour & Grading & Design Lab Questions	*Aug. 2020 – Dec. 2020*

SELECTED AWARDS & HONORS

IPMI 2025 Best Paper Runner-up Award, IPMI	*2025*
MICCAI@24 CXR-LT Challenge Overall Best Solution, MICCAI	*2024*
Yale Conference Travel Funding, Yale	*2024*
Yale University Fellowship, Yale	*2022, 2023, 2024*
Outstanding Graduates of Shanghai, SJTU	*2022*
James B. Angell Scholar, UMich	*2022*
Dean's Honor List & University Honor, UMich	*2020, 2021, 2022*
Undergraduate Volunteer Scholarship, JI, SJTU	*2020*
Undergraduate Scholarship of Excellence, SJTU	*2019, 2020*
John Wu & Jane Sun Scholarship of Excellence, SJTU	*2018, 2019, 2020*

SERVICES

Conference Paper Review	*New Haven, USA*
Reviewer of CVPR, ICCV, ICML, NeurIPS, AAAI, ICLR, AISTATS, MICCAI, IEEE T-MM	*Dec. 2023 – Present*
Joint Institute Student Union	*Shanghai, China*
Leader of Organization Department	*May. 2019 – June. 2020*
Yunnan Kuang Chang Primary School	*Yunnan, China*
Leader of Volunteer Teaching Group	*Dec. 2019 – Feb. 2020*

SKILLS

- Language: **C/C++, Python, JavaScript, MATLAB, Tex, Bash, R, Go, Verilog, Arduino.**
- Framework: **PyTorch, Torch lightning, verl, OpenRLHF, vLLM, Ray, Deepspeed, HuggingFace, Triton, Faiss, transformers.**