

Yuexi Du

Biomedical Engineering :: Computer Vision :: Medical Image Analysis

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EDUCATION

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- Yale University**, New Haven, U.S. *Sept. 2022 – Present*
- ❖ Doctor of Philosophy (Ph.D.) in Biomedical Engineering, Medical Image Analysis direction
 - ❖ Mast of Science (En Route) Obtained in Dec. 2023 with **8 Honors**
 - ❖ Advised by *Prof. Nicha C. Dvornek*.
- University of Michigan**, Ann Arbor, U.S. *Sept. 2020 – May. 2022*
- ❖ Bachelor of Computer Science, Department of Engineering, 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*
- ❖ Bachelor of Science, Electrical Computer Engineering (Dual Degree), **GPA: 3.70/4.00 (Top 10%)**
 - ❖ Course Work: *Programming and Data Structures (A+)*, *Honors Mathematics IV (A+)*

SKILLS

Language: **C/C++**, **Python**, **JavaScript**, **MATLAB**, **Tex**, **Bash**, **R**, **Go**, **Verilog**, **Arduino**.
Framework: **PyTorch**, **TensorFlow**, **HuggingFace**, **OpenCV**, **Faiss**, **OpenSlide**, **Flask**, **React**, **SQLite**, **Hadoop**.

SELECTED PUBLICATIONS

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- [1] [Yuexi Du](#), Brian Chang, Nicha C. Dvornek. **CLEFT: Language-Image Contrastive Learning with Efficient Large Language Model and Prompt Fine-Tuning**. (*in submission*)
 - [2] [Yuexi Du](#), Nicha C. Dvornek, John Onofrey. **R2E2-Conv: Rotation and Reflection Equivariant Efficient Convolution Kernel**. (*in submission*)
 - [3] [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**. 2024 ISBI. [[Paper](#)]
 - [4] [Yuexi Du](#), Ziyang Chen, Justin Salamon, Bryan Russell, Andrew Owens. **Conditional Generation of Audio from Video via Foley Analogies**. 2023 CVPR. [[Project page](#)][[Paper](#)]
 - [5] 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](#)]

INTERN EXPERIENCE

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- Tencent, AI Lab, AI HealthCare** *Advised by Dr. Xiao Han & M.S. Sen Yang*
Pathological Image Treatment Group, Algorithm Development Internship *May 2021 – Sept. 2021*
- ❖ **Objective:** Research on unsupervised contrastive learning and CBIR system for pathological WSI.
 - ❖ **Responsibility:** Introduce periodical moving average clustering guided module to reduce the number of false negatives in the contrastive learning process. Pre-trained model outperforms ImageNet/other SSL pre-trained on multiple downstream tasks. Achieves an accuracy of 93% on the TCGA lung cancer patch classification experiment (ImageNet: 87%, SimCLR: 88%).
 - ❖ **Outcome:** On TCGA WSI retrieval task for primary site of disease and patient level diagnoses test, beats Yottixel & FISH with a surpass of more than 10% in terms of average mean Majority Vote score. Our work is accepted by the top-tier journal Medical Image Analysis.

RESEARCH EXPERIENCE

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- IPAG @ Yale** *Advised by Nicha C. Dvornek, John Onofrey, James Duncan*
Research Assistant *Sept. 2022 – Present*
- ❖ **Objective:** Leading research on multiple biomedical image analysis topics including 1) 4D ventricular motion tracking; 2) Rotation and flipping equivariant CNN; 3) 3D Digital Breast Tomosynthesis (DBT) analysis with self-supervised learning and foundation models.
 - ❖ **Responsibility:** Leading the research projects by designing and implementing the learning frameworks. Design and conduct the experiments on multiple large-scale datasets. Also responsible for paper writing.
 - ❖ **Outcome:** Multiple first-author papers submitted/accepted by conferences.
- Vision @ UMich Research Group** *Advised by Andrew Owens*
Research Assistant *May 2021 – June 2023*
- ❖ **Objective:** Research & development of a novel **condition-based** method of **audio foley generation** with given silent video clip. Conditional visual-sound pair helps to generate **different style of output**.
 - ❖ **Responsibility:** Design and implement the **VQ-GAN** model and auto-regressive model to generate plausible audio according to the target video and user provided conditional audio-visual clips.
 - ❖ **Outcome:** One first author paper accepted by the CVPR 2023.

M.I.N. Lab @ SJTU

Research Assistant

Advised by Weiyao Lin

May 2019 – March 2020

- ❖ **Objective:** Re-Implementing & Developing cutting edge computer vision deep learning algorithms.
- ❖ **Responsibility:** LSTM based **skeleton sequence classification** w.r.t. types of activity program on NTU-RGBD dataset. Re-implement Mask-RCNN based on Fast-RCNN on MXNet framework, which achieves the same level of performance with less training time and batch size.

SELECTED PROJECTS

Parameter Efficient Adaptation for Medical CLIP

Advised by Nicha C. Dvornek

Project Leader

Sept. 2023 – Feb. 2024

- ❖ **Objective:** Boost the medical image vision foundation model pre-training with medical large language model and contrastive language-image pre-training. Using trainable tokens to optimize domain-specific prompts.
- ❖ **Responsibility:** Design and implement medical CLIP framework based on LoRA-adapted LLM. Successfully reduce the training cost with limited resources. Exploit the use of CLIP in the mammograph domain.
- ❖ **Outcome:** One first-author paper submitted.

Controlled and Self-supervised Diffusion MRI Denoising via Diffusion

Advised by Andre Wibisono

Project Leader

Jan. 2023 – May 2023

- ❖ **Objective:** Reduce the un-controlled deformation of diffusion model-based MRI image denoising process.
- ❖ **Responsibility:** Introduce controlled frozen encoder and decoder with zero-convolution to attention-based diffusion UNet. Using DDIM diffusion process to reduce the uncertainty during long diffusion process. Implement the model and experiment it with multiple real-world diffusion MRI dataset.
- ❖ **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]

Protect Face Recognition System against Various Attacks

Advised by Ran Yi

Primary Group Member

May 2022 – Aug. 2022

- ❖ **Objective:** Develop a human face deep-fake detection algorithm that robust to various deep-fake methods.
- ❖ **Responsibility:** Implement the patch-wise discrete cosine frequency transformation blocks to re-encode the video information into different frequency domain. Design and experiment with different 2 stream X3D based video fraud detection architecture and combine with frequency transformation block. Experiment the proposed model on the FF++ dataset.
- ❖ **Outcome:** The final algorithm achieves an SOTA performance with as high as **97.9%** Acc. on the FF++ c40 dataset and **99.8%** Acc. on the Celeb-DF v2 dataset.

TEACHING EXPERIENCE

ENAS 912: Biomedical Image Processing, TF | Yale

Hold weekly Office Hour & Homework Grading & Hold Review Session

Taught by David Fouhey

Sept. 2023 – Dec. 2023

EECS 442: Computer Vision, IA | UMich

Hold weekly Office Hour & Design homework & Manage Piazza

Taught by Prof. David Fouhey

Jan. 2022 – April. 2022

VR 246: Intro to Comics & Graphic Novels, TA | SJTU

Hold weekly Office Hour & Grading, English only

Taught by Joelle Tybon

May. 2021 – Aug. 2021

VE101: Intro to Computer & Programming, TA | SJTU

Leading Review Class & Office Hour & Grading & Design Lab Questions, English only

Taught by Jigang Wu

Aug. 2020 – Dec. 2020

SELECTED HONORS & AWARDS

Yale University Fellowship, Yale

2022, 2023

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

Intro to Engineering Course: Best Innovation Award, JI, SJTU

2019

Undergraduate Scholarship of Excellence, SJTU

2019, 2020

John Wu & Jane Sun Scholarship of Excellence, SJTU

2018, 2019, 2020

OTHER ACTIVITIES & SERVICES

Conference Paper Review

Reviewer

New Haven, USA

Dec. 2023 – Present

- ❖ **Venues:** CVPR, MICCAI.

Joint Institute Student Union

Leader of Organization Department

Shanghai, China

May. 2019 – June. 2020

- ❖ **Keywords:** Student's right affairs; Activity organization.

Yunnan Kuang Chang Primary School

Leader of Volunteer Teaching Group

Yunnan, China

Dec. 2019 – Feb. 2020

- ❖ **Keywords:** Teaching plan design; Activity promotion.