

# Yu CAI

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## EDUCATION

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- The Hong Kong University of Science and Technology**, Hong Kong, China 2022.08 - present  
*Ph.D. student in Electronic and Computer Engineering*  
Supervisors: Prof. Kwang-Ting Cheng & Prof. Hao Chen (CSE)  
CGA: 4.0/4.3
- Huazhong University of Science and Technology**, Wuhan, China 2018.09 - 2022.06  
*B.Eng. (Honours) in Electronic and Information Engineering. (**Excellent Engineer Program**)*  
GPA: 3.93/4.0  
Thesis: *Research on Unsupervised Anomaly Detection in Chest X-Rays. (**Outstanding Undergraduate Thesis**)*  
Supervisor: Prof. Xin Yang

## RESEARCH INTEREST

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Deep Learning, Computer Vision, Medical Image Analysis, Anomaly Detection, etc.

## PUBLICATION

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### Journal Papers

1. **Yu Cai**, Hao Chen, Xin Yang, Yu Zhou, Kwang-ting Cheng. “Dual-distribution discrepancy with self-supervised refinement for anomaly detection in medical images.” *Medical Image Analysis*, 2023. (**MedIA**, **IF: 13.828**)

### Conference Papers

1. **Yu Cai**, Hao Chen, Xin Yang, Yu Zhou, Kwang-ting Cheng. “Dual-Distribution Discrepancy for Anomaly Detection in Chest X-Rays.” *The 25th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2022. Early Accept (Acceptance rate: 13%).

## COMPETITION

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- 2021 APTOS Big Data Competition** 2021.09 - 2021.12
- Designed a Multiple-Instance Learning (MIL) algorithm for Prediction on DME Patients' Response to Anti-VEGF Treatment.
  - Ranked 12/10006.

## PROJECTS

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- Anomaly Detection in Medical Images** 2021.09 - present
- Proposed to utilize the ensembles of reconstruction networks to model the distribution of training data in an unsupervised fashion, taking advantage of unlabeled images for training to improve anomaly detection for the first time. Achieved state-of-the-art results in anomaly detection in chest X-rays and the paper has been accepted for MICCAI 2022.
  - Proposed an Anomaly Score Refinement Net that is trained via self-supervised learning to map the original rough anomaly score map to the final accurate abnormal regions, achieving state-of-the-art results on five medical benchmarks including chest X-rays, brain MRIs, and retinal fundus images. The paper is under review.
- Research on Visual Occlusion Instance Modeling and Extraction** 2020.03 - 2021.03
- Proposed to extract and distinguish the occlusion boundary of each instance in the 2D images based on embedding learning and k-means algorithm. Achieved an AP of 0.801 for occlusion boundary prediction and an AP of 0.736 for occlusion orientation prediction in PIOD dataset.

## Content-Based Image Retrieval System

2020.12 - 2021.01

- Implemented a CBIR system utilizing Product Quantization and Inverted File System for image retrieval based on the pre-trained ResNet-101 features. Achieved an mAP of 0.843 on the Oxford5k dataset, with a speed of 0.14s per image on average on a single NVIDIA TITAN Xp GPU.

## AWARDS

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<i>Honours Bachelor Degree</i> (Top 2% of graduates), HUST	2022.06
<i>Outstanding Graduate</i> , HUST	2022.06
<i>Outstanding Undergraduate Thesis</i> (Top 2%), HUST	2022.06
<i>RedBird PhD Award</i> , HKUST	2022.03
<i>National Scholarship</i> , Ministry of Education of P.R.China	2021.11
<i>Merit Student</i> , HUST	2021.10
<i>Outstanding Undergraduate</i> (Top 1% of sophomore and junior undergraduates), HUST	2020.11
<i>National Scholarship</i> , Ministry of Education of P.R.China	2020.11
<i>Merit Student</i> , HUST	2020.10
<i>Scholarship for Academic Excellence</i> , HUST	2019.10
<i>Scholarship for Self-Improvement</i> , HUST	2019.03

## TEACHING ASSISTANT

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| • ELEC5680 Advanced Deep Learning Architectures | Spring 2023 |
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## SKILLS

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<b>Skills</b>	Python, C, MATLAB, PyTorch, Caffe
<b>Language</b>	TOEFL 91 (R29+L18+S20+W24)