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## Profile

- Postdoctoral Research Fellow of Harvard University.
- PhD in Deep Learning, Computer vision, and Medical AI from Australian Institute for Machine Learning (AIML), University of Adelaide

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## Areas of Interests

- **Deep Learning, Computer Vision, Medical Image Analysis, Anomaly Detection, Out-of-Distribution Detection, Fairness AI, Trustworthy/Responsible AI.**

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## Education/Training

8/2022-Present **Postdoctoral**, Harvard University.

Research Interests: Computer Vision, Fairness AI, Trustworthy AI

6/2022 **PhD**, *Computer Science*, Australian Institute for Machine Learning, University of Adelaide.

PhD thesis: Anomaly Detection in Computer Vision and Medical Imaging.

- Awarded University of Adelaide ECMS Research Scholarship (Full Fee)

12/2018 **BSc (First-Class Honours)**, *Computer Science*, University of Adelaide, GPA 7.0/7.0.

Thesis: Deep Learning Approach for Five-class Polyp Detection and Classification

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## Publications (\* = equal contribution, † = corresponding author)(Google Scholar Citations: 600)

### Preprint/Under-Review

- 35 Yan Luo\*, **Yu Tian\***, and others. Harvard-DR: A 3D Imaging Dataset of Diabetic Retinopathy for Fairness Learning *Submit to Conference on Neural Information Processing Systems (NeurIPS)*, 2023.
- 34 Yan Luo\*, **Yu Tian\***, and others. Harvard Glaucoma Fairness: A Retinal Nerve Disease Dataset for Fairness Learning and Fair Identity Normalization. *Submit to IEEE Transactions on Medical Imaging (TMI)*, Under Review, 2023.
- 33 Jinan Zou\*, Maihao Guo\*, **Yu Tian\***, and others. Semantic Role Labeling Guided Out-of-distribution Detection. *Submit SIGNLL Conference on Computational Natural Language Learning (CoNLL)*, 2023.

### First-author Publications

- 32 Yan Luo\*, Min Shi\*, **Yu Tian\***, and others. Harvard Glaucoma Detection and Progression: A Multimodal Multitask Dataset and Generalization-Reinforced Semi-Supervised Learning. *International Conference on Computer Vision (ICCV)*, 2023.
- 31 **Yu Tian\***, Fengbei Liu\*, and others. Self-supervised Multi-class Pre-training for Unsupervised Anomaly Detection and Segmentation in Medical Images. *Medical Image Analysis (MedIA)*, 2023.
- 30 **Yu Tian**, and others. Unsupervised Anomaly Detection in Medical Images with a Memory-augmented Multi-level Cross-attentional Masked Autoencoder. *International Workshop on Machine Learning in Medical Imaging (MICCAI-MLMI)*, 2023.
- 29 **Yu Tian\***, Yuyuan Liu\*, and others. Pixel-wise Energy-biased Abstention Learning for Anomaly Segmentation on Complex Urban Driving Scenes. *European Conference on Computer Vision (ECCV)*, 2022, **Oral**. (Acceptance rate < 2.7%)
- 28 **Yu Tian**, and others. Contrastive Transformer-based Multiple Instance Learning for Weakly Supervised Polyp Frame Detection. *International Conference on Medical Imaging Computing and Computer-Assisted Intervention (MICCAI)*, 2022, **Early Accept**. (Acceptance rate < 13%)

- 27 Yuanhong Chen\*, **Yu Tian**\*<sup>†</sup>, and others. Deep One-Class Classification via Interpolated Gaussian Descriptor. In *Thirty-Sixth AAAI Conference on Artificial Intelligence (AAAI)*, 2022, **Oral**. (Acceptance rate < 4.5%)
- 26 **Yu Tian**, and others. Weakly-supervised Video Anomaly Detection with Robust Temporal Feature Magnitude Learning. In *International Conference on Computer Vision (ICCV)*, 2021. (Acceptance rate < 25%)
- 25 **Yu Tian**, and others. Constrained Contrastive Distribution Learning for Unsupervised Anomaly Detection and Localisation in Medical Images. In *International Conference on Medical Imaging Computing and Computer-Assisted Intervention (MICCAI)*, 2021. (Acceptance rate < 32%)
- 24 Fengbei Liu\*, **Yu Tian**\*, and others. Self-supervised Mean Teacher for Semi-supervised Chest X-ray Classification. *International Workshop on Machine Learning in Medical Imaging (MICCAI-MLMI)*, 2021.
- 23 Fengbei Liu\*, **Yu Tian**\*, and others. ACPL: Anti-curriculum Pseudo-labelling for Semi-supervised Medical Image Classification. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2022. (Acceptance rate < 26%)
- 22 **Yu Tian**, and others. Few-Shot Anomaly Detection for Polyp Frames from Colonoscopy. *International Conference on Medical Imaging Computing and Computer-Assisted Intervention (MICCAI)*, 2020. (Acceptance rate < 30%)
- 21 Yuyuan Liu\*, **Yu Tian**\*<sup>†</sup>, and others. Photoshopping Colonoscopy Video Frames. *International Symposium on Biomedical Imaging (ISBI)*, 2020. (Acceptance rate < 35%)
- 20 **Yu Tian**, and others. One-stage Five-class Polyp Detection and Classification. In *International Symposium on Biomedical Imaging (ISBI)*, 2019. (Acceptance rate < 35%)
- 19 **Yu Tian**, and others. Detecting, Localising and Classifying Polyps from Colonoscopy Videos using Deep Learning. Invited book chapter in *Deep Learning for Medical Image Analysis (second edition)*, 2021.

### Co-author Publications

- 18 Saber Kazeminasab, Mojtaba Fazli, Sayuri Sekimitsu, Mohammad Eslami, Min Shi, **Yu Tian**, and others. An Artificial Intelligence Method for Phenotyping of OCT Scans Using Unsupervised and Self-supervised Deep Learning. *MedArxiv*, Under Review, 2023.
- 17 Min Shi, **Yu Tian**, and others. Transformer-based Deep Learning Prediction of 10-Degree Humphrey Visual Field Tests from 24-Degree Data. *Submit to JAMA Ophthalmology (Selected as Oral in ARVO)*, Under Review, 2023.
- 16 Min Shi, Jessica Sun, Anagha Lokhande, **Yu Tian**, and others. Artifact Correction in Retinal Nerve Fiber Layer Thickness Maps Using Deep Learning and Its Clinical Utility in Glaucoma. *Submit to Translational Vision Science & Technology (TVST)*, Under Review, 2023.
- 15 Jiawen Zhu, Choubo Ding, **Yu Tian**, and others. Anomaly Heterogeneity Learning for Open-set Supervised Anomaly Detection. *Arxiv Preprint*, Under Review, 2024.
- 14 Fengbei Liu, Yuanhong Chen, Chong Wang, **Yu Tian**, Gustavo Carneiro. Asymmetric Co-teaching with Multi-view Consensus for Noisy Label Learning. *Arxiv Preprint*, Under Review, 2024.
- 13 Chong Wang, Yuyuan Liu, Yuanhong Chen, Fengbei Liu, **Yu Tian**, and others. Learning Support and Trivial Prototypes for Interpretable Image Classification. *International Conference on Computer Vision (ICCV)*, 2023.
- 12 Yuanhong Chen, Fengbei Liu, Hu Wang, Chong Wang, Yuyuan Liu, **Yu Tian**, Gustavo Carneiro. BoMD: Bag of Multi-label Descriptors for Noisy Chest X-ray Classification. *International Conference on Computer Vision (ICCV)*, 2023.
- 11 Yuyuan Liu\*, Choubo Ding\*, **Yu Tian**, and others. Residual Pattern Learning for Pixel-wise Out-of-Distribution Detection in Semantic Segmentation. *International Conference on Computer Vision (ICCV)*, 2023.
- 10 Min Shi, **Yu Tian**, and others. RNFLT2Vec: Artifact-Corrected Representation Learning for Retinal Nerve Fiber Layer Thickness Maps. *Medical Image Analysis (MedIA)*, 2023.
- 9 Min Shi, Mojtaba S. Fazli, Vishal Sharma, **Yu Tian**, and others. Artifact-Tolerant Clustering-Guided Contrastive Embedding Learning for Ophthalmic Images. *IEEE Journal of Biomedical and Health Informatics (JBHI)*, 2023.

- 8 Yuanhong Chen, Yuyuan Liu, Chong Wang, Michael Elliott, Chun Fung Kwok, Carlos Pena-Solorzano, **Yu Tian**, and others. BRAIxDet: Learning to Detect Malignant Breast Lesion with Incomplete Annotations. *Medical Image Analysis (MedIA)*, Under Review, 2023.
- 7 Yuyuan Liu, **Yu Tian**, and others. Translation Consistent Semi-supervised Segmentation for 3D Medical Images. *IEEE Transactions on Medical Imaging (TMI)*, Under Review, 2023.
- 6 Yuanhong Chen, Wang Hu, Chong Wang, **Yu Tian**, and others. Multi-view Local Co-occurrence and Global Consistency Learning Improve Mammogram Classification Generalisation. *International Conference on Medical Imaging Computing and Computer-Assisted Intervention (MICCAI)*, 2022, **Early Accept.** (Acceptance rate < 13%)
- 5 Chong Wang, Yuanhong Chen, Yuyuan Liu, **Yu Tian**, and others. Knowledge Distillation to Ensemble Global and Interpretable Prototype-based Mammogram Classification Models. *International Conference on Medical Imaging Computing and Computer-Assisted Intervention (MICCAI)*, 2022, **Early Accept.** (Acceptance rate < 13%)
- 4 Fengbei Liu, Yuanhong Chen, **Yu Tian**, and others. NVUM: Non-Volatile Unbiased Memory for Robust Medical Image Classification. *International Conference on Medical Imaging Computing and Computer-Assisted Intervention (MICCAI)*, 2022, **Early Accept.** (Acceptance rate < 13%)
- 3 Yuyuan Liu, **Yu Tian**, and others. Perturbed and Strict Mean Teachers for Semi-supervised Semantic Segmentation. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2022. (Acceptance rate < 26%)
- 2 Leonardo Z.C.T. Pu, Gabriel Maicas, **Yu Tian**, and others. Computer-aided diagnosis for characterization of colorectal lesions: a comprehensive software including serrated lesions. In *Gastrointestinal Endoscopy (GIE)*, 2020. (IF = 10.396)
- 1 Leonardo Z.C.T. Pu, Gabriel Maicas, **Yu Tian**, and others. Prospective study assessing a comprehensive computer-aided diagnosis for characterization of colorectal lesions: Results from different centers and imaging technologies. In *Journal of Gastroenterology and Hepatology*, 2019. (IF = 4.029)

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## Project Experience

- 8/2022–Present Postdoctoral Research Fellow, Harvard University.
- Research in Computer Vision and Medical Imaging
  - Publish and submit multiple top computer vision conference papers (CVPR/ICCV/NeurIPS)
  - Publish and submit multiple medical imaging top journal papers (TMI/JBHI/Ophthalmology/Lancet Digital Health)
  - Lead research projects and supervise multiple students and interns
- 3/2018–7/2022 Research Assistant and PhD Candidate, Australian Institute for Machine Learning, University of Adelaide.
- Anomaly Detection for Surveillance Videos
  - Anomaly Detection for Industrial Defect Detection, Self-driving System/Semantic Segmentation, Medical Images, and Videos.
  - Unsupervised, Semi, Weakly, Self-Supervised, and Noisy-label Learning
  - Lead research projects and supervise master and junior PhD students
  - 10+ top computer vision conference papers (CVPR/ICCV/ECCV/AAAI)
  - 10+ top medical imaging conference/journal papers (TMI/MedIA/MICCAI/ISBI)

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## Teaching Experience

- Artificial Intelligence in Medicine, Harvard University, 2023
- COMP SCI 7097A/B - Master Data Science Research Project, University of Adelaide, 2021

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## Invited Talks

- Selected as one of the five researchers to give a presentation about AI for vision science on Fellow's Recognition Day of Harvard Ophthalmology Department.
- Co-organising and presenting the CVPR 2023 tutorial 'Recent Advances in Anomaly Detection'.
- Invited talk at IJCAI Workshop on "AI for Anomalies and Novelties" 2021 about weakly supervised video anomaly detection.

- Invited talk at GESA Research Workshop 2022 about Anomaly Detection in Medical Imaging.
- Invited talk at USTC Suzhou Institute of Advanced Research about my recent works in anomaly/ood detection.

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## Student Advising

- 2019 Yuyuan Liu (Honour student at the University of Adelaide - Now a PhD student at AIML)
  - Project: Unsupervised Anomaly Detection for Colonoscopy (Papers in ISBI and CVPR)
- 2020 Yuanhong Chen (Honour student at the University of Adelaide - Now a PhD student at AIML)
  - Project: Image Anomaly Detection (Papers in AAAI and ICCV)
- 2021 Ruixuan Zou (Master student at the University of Adelaide - Now a research assistant at AIML)
  - Project: Anomaly Detection with Transformer for Medical Imaging
- 2023 Axel De Nardin (Research Intern at Harvard)
  - Project: 3D Anomaly Detection and Medical AI
- 2023 Ava Kouhana (Research Intern at Harvard)
  - Project: Computer vision and Medical AI
- 2023 Carola Rutigliani (Research Intern at Harvard)
  - Project: Medical AI

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## Professional Activities

### Guest Editor

- MDPI Sensors Special Issue: Biomedical Sensing and Bioinformatics Processing

### Journal Reviewer

- IEEE Transactions on Pattern Analysis and Machine Intelligence (**TPAMI**)
- IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**)
- IEEE Transactions on Medical Imaging (**TMI**)
- IEEE Transactions on Image Processing (**TIP**)
- ACM Computing Surveys (**CSUR**)
- Pattern Recognition (**PR**)
- Computerized Medical Imaging and Graphics
- Plos Digital Health

### Conference Reviewer/Program Committee

- Conference on Neural Information Processing Systems (**NeurIPS**) 2023
- International Conference on Medical Imaging Computing and Computer-Assisted Intervention (**MICCAI**) 2021, 2022, 2023
- International Conference on Computer Vision (**ICCV**) 2021, 2023
- Thirty-Sixth AAAI Conference on Artificial Intelligence (**AAAI**) 2022, 2023, 2024
- International Conference on Computer Vision and Pattern Recognition (**CVPR**) 2022, 2023
- European Conference on Computer Vision (**ECCV**) 2022
- ANDEA Workshop, **KDD** 2022

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## Honors and Awards

- 2019–2022 University of Adelaide ECMS Research Scholarship (Full Fee)
- 2018 Dean's Recognition of Academic Excellence of Honours Graduate (GPA 7.0/7.0)
- Media Coverage Harvard News, University of Adelaide, The Lead, The Advertiser Australia, Hospital and Healthcare Australia, IT Wire, Radiology Business

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## References

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