Yongcheng Yao

UKRI Centre for Doctoral Training in Biomedical AI
School of Informatics, University of Edinburgh, United Kingdom
yc.yao@ed.ac.uk yongchengyao.github.io github.com/YongchengYAO
Google Scholar 0000-0003-2754-3649 LinkedIn

Education

PhD in Biomedical Artificial Intelligence 2024 – present
University of Edinburgh (UoE) *Edinburgh, UK*

MScR in Biomedical Artificial Intelligence 2024
University of Edinburgh (UoE) *Edinburgh, UK*

MPhil in Imaging and Interventional Radiology 2020
The Chinese University of Hong Kong (CUHK) *Hong Kong*

BEng in Biomedical Engineering 2017
South China University of Technology (SCUT) *Guangzhou, China*

Research Interests

Large language model, vision language model, representation in LLM/VLM, visual reasoning, mechanistic interpretation, computer vision, medical image analysis

Research Experience

PhD Researcher (UoE) 2023 – present

- **MedVision**, a large-scale, multi-anatomy, multi-modality benchmark and dataset for quantitative medical image analysis with vision language models (EMNLP26 Main).
- **CheXGenBench**, a benchmark for the use of synthetic chest X-ray (Dutt et al., TMLR, 2026);
- Working on space-time-aware Transformer, benchmarking spatial temporal reasoning tasks

Research Assistant (CUHK) 2020 – 2023

- **CartiMorph**, a deep-learning framework for automated knee articular cartilage morphometrics covering segmentation, registration, template learning, thickness mapping and lesion quantification (Yao et al., MedIA, 2024). Released the code, the **CartiMorph Toolbox** and **Viewer** (MICCAI24), and the **OAIZIB-CM** dataset.
- First inventor of the cartilage thickness-mapping system (US Patent: US12620088B2); **Silver Medal** at the 48th Geneva International Exhibition of Inventions (2022); CUHK Patent Application Fund (2022); seed-funding offer from the HKSTP Ideation Programme (2023). Showcased at CUHK Entrepreneur Day and the Hong Kong International Medical and Healthcare Fair (2022).
- Co-first author on unsupervised domain adaptation for knee osteoarthritis phenotype classification (Zhong et al,, QIMS, 2023) and on a systematic post-processing pipeline for quantitative $T_{1\rho}$ imaging of knee cartilage (ISMRM24).
- Contributed to precise knee tissue segmentation (Khan et al., CMPB, 2022) and semi-supervised meniscus segmentation (Li et al., Neural Networks, 2026).

MPhil Student (CUHK) 2018 – 2020

- Studied the reorganisation of functional brain networks in patients with post-stroke depressive symptoms using resting-state fMRI (Liang et al., JAD, 2020); brain activity indexing via network clustering (ICBME 2019, oral).

Publications

Full list: Google Scholar.

Peer-Reviewed Conference Papers

[C1] **Yongcheng Yao**, Yongshuo Zong, Raman Dutt, Yongxin Yang, Sotirios A. Tsaftaris, Timothy Hospedales. MedVision: Benchmarking Quantitative Medical Image Analysis. *Proceedings of the 2026*

Conference on Empirical Methods in Natural Language Processing (EMNLP 2026, Main), pp. 31065–31102, Association for Computational Linguistics, 2026. [paper] [project] [code] [data]

[C2] **Yongcheng Yao**, Weitian Chen. Quantifying Knee Cartilage Shape and Lesion: From Image to Metrics. *Applications of Medical Artificial Intelligence (AMAI 2024, MICCAI Workshop)*, LNCS vol. 15384, pp. 162–172, Springer, 2025. [paper] [code]

Journal Articles

[J1] Siyue Li, **Yongcheng Yao**, Junru Zhong, Shutian Zhao, Fan Xiao, Tim-Yun Michael Ong, Ki-Wai Kevin Ho, James F. Griffith, Yudong Zhang, Shuihua Wang, Jin Hong, Weitian Chen. ERANet: Edge replacement augmentation for semi-supervised meniscus segmentation with prototype consistency alignment and conditional self-training. *Neural Networks*, 196:108337, 2026. [paper]

[J2] Raman Dutt, Pedro Sanchez, **Yongcheng Yao**, Steven McDonagh, Sotirios A. Tsaftaris, Timothy Hospedales. CheXGenBench: A Unified Benchmark for Fidelity, Privacy and Utility of Synthetic Chest Radiographs. *Transactions on Machine Learning Research (TMLR)*, 2026. [paper] [project]

[J3] **Yongcheng Yao**, Junru Zhong, Liping Zhang, Sheheryar Khan, Weitian Chen. CartiMorph: A framework for automated knee articular cartilage morphometrics. *Medical Image Analysis*, 91:103035, 2024. [paper] [code] [data]

[J4] Junru Zhong*, **Yongcheng Yao***, Dónal G. Cahill, Fan Xiao, Siyue Li, Jack Lee, Kevin Ki-Wai Ho, Michael Tim-Yun Ong, James F. Griffith, Weitian Chen. Unsupervised domain adaptation for automated knee osteoarthritis phenotype classification. *Quantitative Imaging in Medicine and Surgery*, 13(11):7444–7458, 2023. [paper]

[J5] Sheheryar Khan, Basim Azam, **Yongcheng Yao**, Weitian Chen. Deep collaborative network with alpha matte for precise knee tissue segmentation from MRI. *Computer Methods and Programs in Biomedicine*, 222:106963, 2022. [paper]

[J6] Yan Liang, **Yongcheng Yao**, Lei Zhao, Lin Shi, Yang-Kun Chen, Vincent C. T. Mok, Gabor S. Ungvari, Winnie C. W. Chu, Wai-Kwong Tang. Topological reorganization of the default mode network in patients with poststroke depressive symptoms: A resting-state fMRI study. *Journal of Affective Disorders*, 260:557–568, 2020. [paper]

[J7] Xiaobing Lu, Yongzhe Yang, Fengchun Wu, Minjian Gao, Yong Xu, Yue Zhang, **Yongcheng Yao**, Xin Du, Chengwei Li, Lei Wu, Xiaomei Zhong, Yanling Zhou, Ni Fan, Yingjun Zheng, Dongsheng Xiong, Hongjun Peng, Javier Escudero, Biao Huang, Xiaobo Li, Yuping Ning, Kai Wu. Discriminative analysis of schizophrenia using support vector machine and recursive feature elimination on structural MRI images. *Medicine*, 95(30):e3973, 2016. [paper]

Preprints

[P1] Junru Zhong*, **Yongcheng Yao***, Fan Xiao, Tim-Yun Michael Ong, Ki-Wai Kevin Ho, Siyue Li, Chaoxing Huang, Queenie Chan, James F. Griffith, Weitian Chen. A Systematic Post-Processing Approach for Quantitative $T_{1\rho}$ Imaging of Knee Articular Cartilage. *arXiv:2409.12600*, 2024. [arXiv]

[P2] **Yongcheng Yao**. Altered Topological Properties of Functional Brain Network Associated with Alzheimer's Disease. *arXiv:2305.08159*, 2023. [arXiv] [data]

[P3] **Yongcheng Yao**. Abnormal Functional Brain Network Connectivity Associated with Alzheimer's Disease. *arXiv:2305.09186*, 2023. [arXiv] [data]

Conference Abstracts & Presentations

[A1] Junru Zhong, **Yongcheng Yao**, Fan Xiao, Michael Tim-Yun Ong, Kevin Ki-Wai Ho, Queenie Chan, James F. Griffith, Weitian Chen. A systematic automated post-processing approach for quantitative analysis of 3D $T_{1\rho}$ knee MRI. *ISMRM Annual Meeting*, 2024. Poster.

[A2] **Yongcheng Yao**, Weitian Chen. Deep-Learning-Based Knee Articular Cartilage Morphometrics. *ISMRM Annual Meeting*, 2023. Poster. [video]

[A3] Junru Zhong, **Yongcheng Yao**, Dónal G. Cahill, Fan Xiao, Siyue Li, Jack Lee, Kevin Ki-Wai Ho, Michael Tim-Yun Ong, James F. Griffith, Weitian Chen. Unsupervised Domain Adaptation for Automated Knee Osteoarthritis Phenotype Classification. *ISMRM Annual Meeting*, 2023. Poster.

[A4] **Yongcheng Yao**, Dónal G. Cahill, James F. Griffith, Weitian Chen. A Systematic Cartilage Surface Segmentation Method for Cartilage Thickness Mapping. *ISMRM Annual Meeting*, London, 2022. Oral. [video]

[A5] Junru Zhong, **Yongcheng Yao**, Sheheryar Khan, Fan Xiao, Dónal G. Cahill, James F. Griffith, Weitian Chen. Knee Osteoarthritis: Automatic Grading with Deep Learning. *ISMRM Annual Meeting*, London, 2022. Oral.

[A6] **Yongcheng Yao**, Sheheryar Khan, Junru Zhong, Siyue Li, Weitian Chen. Automated Knee Cartilage Thickness Measurement from Magnetic Resonance Images. *ISMRM Annual Meeting*, 2021. Poster.

[A7] Siyue Li, Shutian Zhao, **Yongcheng Yao**, Weitian Chen. Deep Learning-based Semi-supervised Meniscus Segmentation with Uncertainty Estimation. *ISMRM Annual Meeting*, 2021. Oral.

[A8] **Yongcheng Yao**, Dylan Ho, Lin Shi. Brain Activity Indexing via Network Clustering. *17th International Conference on Biomedical Engineering (ICBME)*, Singapore, 2019. Oral.

Patents

- **Yongcheng Yao**, Weitian Chen. System and Method for Articular Cartilage Thickness Mapping and Lesion Quantification. [US Patent 12,620,088 B2]

Awards & Honours

- **Silver Medal**, 48th Geneva International Exhibition of Inventions (2022).
- The Keyuan (2016), Longsun (2015), and Dow (2016) Scholarship, South China University of Technology.

Open-Source Project & Contribution

- **MedVision** (code, data): a benchmark and large-scale, multi-anatomy, multi-modality dataset for quantitative medical image analysis with vision–language models.
- **CartiMorph** (code): a framework for automated knee articular cartilage morphometrics, released with the **OAIZIB-CM** dataset of 507 knee MRIs and segmentation masks (Hugging Face, Zenodo).
- **CartiMorph Toolbox** (code) and **CartiMorph Viewer** (code): a platform for knee cartilage morphometrics and its companion visualisation tool.
- **snnUNet** (code): an interface for training, fine-tuning, evaluation and inference of nnU-Net.
- **EvolvingLMMs-Lab/lmms-eval** (PRs): a VLM evaluation framework

Academic Service

- Reviewer: MICCAI, Artificial Intelligence in Medicine, IEEE Transactions on Biomedical Engineering (TBME)