CityU School of Data Science
香港城市大學
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AI-Generated Medical Image

Date: 11 April 2024 (Thursday)

Time: 10:00am - 11:00am

Seminar Link: https://cityu.zoom.us/j/99802193337

ABSTRACT

Medical images are widely used in clinical decision making and artificial intelligence (AI) technologies are commonly utilized in medical imaging and image analysis. In this talk, we address the aspect of medical imaging and present an overview of how AI facilitates the generation of medical image through recovery and synthesis. Medical image recovery attempts to recover the original image under adverse imaging conditions, such as metal artifacts, slow acquisition time, etc. Medical image synthesis attempts to synthesize, from an acquired image under current conditions, a novel image under different conditions. We will cover three neural approaches:

(i) Dual domain network (DuDoNet) for metal artifact reduction in CT via joint learning in both sinogram and image domains and MR image reconstruction from undersampled k-space data via joint and recurrent learning in both frequency and image domains.

(ii) Causal image synthesis (CIS) for counterfactually synthesizing MR brain images in 3D via a seamless, novel integration of a causal graph and 3D StyleGAN, which then form bases for better prediction of future brain conditions.

(iii) Unified multimodal image synthesis (UMIS) for imputing missing MR images of multiple modalities from any combination of available ones with a single unified model.

Our recovery and synthesis approaches leverage deep neural networks as cores, integrate specific domain knowledge, achieve high quality images, and enable better clinical decision.

Professor S. Kevin ZHOU

GUEST SPEAKER'S PROFILE

Prof. S. Kevin ZHOU obtained his PhD degree from University of Maryland, College Park and currently is a Distinguished Professor and Founding Executive Dean of School of Biomedical Engineering, University of Science and Technology of China (USTC). He was a Principal Expert of AI and a Senior R&D Director at Siemens Healthineers Research. Prof. Zhou has published 300+ book chapters and peer-reviewed journal and conference papers, registered 150+ granted patents, and written and edited 8 research monographs. The two recent books he led the edition are entitled "Deep Learning for Medical Image Analysis (2nd Edition), SK Zhou, H Greenspan, DG Shen (Eds.)" and "Handbook of Medical Image Computing and Computer Assisted Intervention, SK Zhou, D Rueckert, G Fichtinger (Eds.)". He has won multiple awards including R&D 100 Award (Oscar of Invention), Siemens Inventor of the Year, UMD ECE Distinguished Alumni Award, etc. He will be General Co-Chair for MICCAI 2026, Hawaii, has been a Program Co-Chair for MICCAI 2020 conference, an editorial board member for IEEE Trans. Medical Imaging (TMI, 16-23), IEEE Trans. Pattern Analysis and Machine Intelligence (TPAMI), and Medical Image Analysis, and an area chair for AAAI, CVPR, ECCV, ICCV, MICCAI, and NeurIPS. He has been elected as a Treasurer and Board member of the MICCAI Society (19-23), an Advisory Board Member of MONAI (Medical Open Network for AI), and a fellow of AIMBE, IAMBE, IEEE, MICCAI, and NAI.