

Traits and Trends of AI in Medical Imaging

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Zoom link: <https://us02web.zoom.us/j/82290769595>

Live broadcast link :

Youtube: <https://www.youtube.com/@medicalimageanalysiszmic1514/streams>

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>> Abstract

Artificial intelligence or deep learning technologies have gained prevalence in solving medical imaging tasks. In this talk, we first review the traits that characterize medical images, such as multi-modalities, heterogeneous and isolated data, sparse and noisy labels, imbalanced samples. We then point out the necessity of a paradigm shift from "small task, big data" to "big task, small data". Finally, we illustrate the trends of AI technologies in medical imaging and present a multitude of algorithms that attempt to address various aspects of "big task, small data":

- **Annotation-efficient methods** that tackle medical image analysis without many labelled instances, including one-shot or label-free inference approaches.
- **Universal models** that learn "common + specific" feature representations for multi-domain tasks to unleash the potential of 'pooled bigger data', which are formed by integrating multiple datasets associated with tasks of interest into one use.
- **"Deep learning + knowledge modeling" approaches**, which combine machine learning with domain knowledge to enable start-of-the-art performances for many tasks of medical image reconstruction, recognition, segmentation, and parsing.

>> Biography

Prof. S. Kevin Zhou obtained his PhD degree from University of Maryland, College Park. Currently he is a distinguished professor and founding executive dean of School of Biomedical Engineering, University of Science and Technology of China (USTC) and an adjunct professor at Institute of Computing Technology, Chinese Academy of Sciences and Chinese University of Hong Kong (CUHK), Shenzhen. Prior to this, he was a principal expert and a senior R&D director at Siemens Healthcare Research. Dr. Zhou has published 250+ book chapters and peer-reviewed journal and conference papers, registered 140+ granted patents, written three research monographs, and edited three books. The two recent books he led the edition are entitled "Deep Learning for Medical Image Analysis, 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, BMEF Editor of the Year, Finalist Paper for MICCAI Young Scientist Award (twice). He has been a program co-chair for MICCAI2020, an associate editor for IEEE Trans. Medical Imaging, IEEE Trans. Pattern Analysis and Machine Intelligence, and Medical Image Analysis, and an area chair for AAAI, CVPR, ICCV, MICCAI, and NeurIPS. He has been elected as a treasurer and board member of the MICCAI Society, an advisory board member of MONAI (Medical Open Network for AI), and a fellow of AIMBE, IAMBE, IEEE, MICCAI, and NAI (National Academy of Inventors).