

# CIDSE Invited Talk

## with Jianming Liang & Zongwei Zhou

### Annotation-efficient Deep Learning for Computer-aided Diagnosis in Medical Imaging



Jianming Liang



Zongwei Zhou

**Friday, November 6, 2020**

**2:00 PM**

**ZOOM - <https://asu.zoom.us/j/3236325679>**

#### ABSTRACT

Behind the great success of medical imaging, a crisis is looming: The number of imaging studies is growing exponentially; the workload of radiologists is increasing dramatically; the health care cost related to imaging is rising rapidly. We are facing a grand new challenge: Image Data Explosion—modern imaging systems generate enormous volumes of data, far exceeding human abilities for interpretation. What is paramount, however, is not the images themselves but rather the clinically relevant information contained within them. To automatically glean the clinically relevant information from medical images to improve diagnosis accuracy and efficiency, computer-aided diagnosis (CAD) empowered by artificial intelligence and deep learning (AI/DL) holds great promise. However, developing such CAD systems is impeded by a significant barrier: Deep learning is data hungry in nature, demanding large, high-quality annotated datasets. To overcome this barrier, we have been focusing on developing novel methodologies by exploiting the intrinsic properties of medical images. In the first part of this joint talk, Dr. Liang introduces computer-aided diagnosis in medical imaging, reviews the advantages that medical imaging offers for deep learning research, and outlines the research topics towards annotation-efficient deep learning for medical imaging. In the second part of the talk, Mr. Zhou focuses on three specific topics as part of his PhD dissertation: (1) acquiring necessary annotation efficiently from human experts; (2) utilizing existing annotation effectively from advanced architecture; and (3) extracting generic knowledge directly from unannotated images.

#### BIO

**Jianming Liang** is an Associate Professor and a member of graduate faculties of biomedical informatics, computer science, computer engineering, and biomedical engineering at ASU as well as an Adjunct Associate Professor of Radiology at Mayo Clinic. He was an inaugural Mayo Clinic-ASU Alliance Fellow. During his sabbatical, he was an Invited Professor at Montreal University Hospital Research Center (CRCHUM) and Mila – Quebec Artificial Intelligence Institute, where he was immersed in deep learning for medical imaging. Funded by the NIH, his research is highly interdisciplinary, meshing multiple branches of science and engineering with several specialties for direct clinical impacts. In addition to his 90+ peer-reviewed publications, he holds 28 US patents with an additional 30 patents pending. Dr. Liang has been inducted into the National Academy of Inventors (NAI), and his research has led to FDA-approved products. He has received several awards at ASU, including President's Award for Innovation (2015), CHS Faculty Innovation Award (2019), and CHS Faculty Mentoring Award (2020).

**Zongwei Zhou** is currently a Ph.D. candidate in Biomedical Informatics at Arizona State University, supervised by Dr. Jianming Liang. He has received a B.S. degree with honors in Computer Science from Dalian University of Technology in 2016. He has also spent time at Mayo Clinic, University of California, Berkeley, and Université de Montréal. Drawing upon the realms of biomedical informatics, computer vision, and deep learning, his research focuses on developing novel methodologies to minimize the annotation efforts for computer-aided diagnosis, therapy, and surgery. Mr. Zhou has published 10+ peer-reviewed publications in prestigious journals and conferences in his field. He is the recipient of the MICCAI Young Scientist Award and Media Best Paper Award.

Hosted by: Yalin Wang

school of **computing, informatics,**  
**decision systems engineering**