**Representation Learning in Multimodal Spatiotemporal Image-Guided Procedures**

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Abstract:

Medical image computing and computer-assisted analytics are playing a vital role in healthcare by helping early and accurate diagnosis as well as guidance in the intervention. Advances in technology enhance medical imaging by enabling new modalities and better image quality. In addition, development in the field of robotics and vision exponentially improves the computer-aided minimally invasive surgery. These increase the demand for developing image-guided computational models to analyze the data and assist in clinical decision making. Recently, deep learning has started a new era in artificial intelligence (AI) research with a major breakthrough in most areas of computer vision, natural language processing, and robotics. However, to ensure high performance, deep convolutional neural networks (DCNN) is getting heavy-weighted and computationally expensive. It makes the DCNN difficult to apply directly in real-time processing, especially in image-guided medical approaches with high quality multimodal and spatiotemporal data. Moreover, there is an inherent and intricate representation of information in multimodal image analysis, which requires redesigning efficient deep learning models in theragnostic procedures. In this talk, we address challenges in medical imaging to automate and enhance the image-guided therapy and intervention with a few case studies.

Biography:

Hongliang Ren is currently leading a research group on medical mechatronics in the Biomedical Engineering Department of National University of Singapore (NUS). He is an affiliated Principal Investigator for the Singapore N.1. Institute of Neurotechnology (SINAPSE/N.1.), NUS (Suzhou) Research Institute, and Advanced Robotics Center at National University of Singapore (NUS). Dr. Ren received his Ph.D. in Electronic Engineering (Specialized in Biomedical Engineering) from The Chinese University of Hong Kong (CUHK) in 2008. Prior to joining NUS, he was a Research Fellow at The Johns Hopkins University, Children's Hospital Boston & Harvard Medical School, and Children's National Medical Center, USA. His main areas of interest include biorobotics & intelligent control, medical mechatronics, soft continuum robots and sensors, multisensory learning in surgical robotics. Dr. Ren is IEEE Senior Member and currently serves as Associate Editor for IEEE Transactions on Automation Science & Engineering (T-ASE) and Medical & Biological Engineering & Computing (MBEC). He is the recipient of NUS Young Investigator Award & Engineering Young Researcher Award, IAMBE Early Career Award 2018, Interstellar Early Career Investigator Award 2018 & ICBHI Young Investigator Award 2019.