

Biomedical Image Analysis - Modeling, Simulation and Inference

Liang Liang, Ph.D.

Dr. Liang is currently a postdoctoral fellow at the Department of Biomedical Engineering, Georgia Institute of Technology. He is funded by a postdoc fellowship from American Heart Association. He obtained Ph.D. of Electrical Engineering from Yale University, Master of Engineering from Chinese Academy of Sciences (Beijing, China), and Bachelor of Engineering from the Department of Automation at Tsinghua University (Beijing, China).



Abstract

Liang will present his research on biomedical image analysis which includes modeling, simulation and inference. He will start from biological image analysis for studying cellular processes, including fluorescence imaging, object detection and tracking. The images from just one experiment may contain tens of thousands of objects (e.g. bio-particles) with high density, which makes it almost infeasible to manually analyze the image data. To resolve this challenge, Liang developed a novel multiple hypothesis based tracking method using state space representation and mixed integer programming, which automatically recovers the object trajectories and outperforms traditional methods. From the tracking results, we were able to infer the role of a chemical compound from the cellular behaviors. Then he will present his recent work on medical image analysis. Soft tissue biomechanical modeling and finite element analysis (FEA) have shown promising results for medical diagnosis (e.g. evaluating thoracic aortic aneurysm) but have limited clinical translatability due to heavy manual workload and long simulation time. To resolve the bottlenecks, Liang developed machine learning based methods that can automatically build FE models of aorta and aortic valve from images and serve as a fast surrogate of FEA. He will also show other machine learning applications for image analysis.

TUESDAY, APRIL 3, 2018
9:00 AM | Luddy Hall 4063

