Biomechanics Based Soft Tissue Kinematics Analysis using Medical Image Sequence

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Abstract:

Estimation of soft tissue kinematics (motion and deformation) from 3D image sequences has many important implications in medical image computing, such as diagnosis of heart disease and image guided surgery. In this talk we will describe a strategy by using biomechanical material models, within a Bayesian framework which allows for proper modeling of image noise, in order to estimate these parameters. The resulting partial differential equations are discretized and solved using finite element method.

We will demonstrate the application of this framework to estimate strains from in vivo left ventricular MR images, where myocardial fibrous structural information is incorporated. The deformation estimates obtained exhibit similar patterns with measurements obtained from more invasive techniques, used as a gold standard.