

BHE-033
Biomedical Image Processing - Problem-oriented Methodology

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Abstract

Our project aims at developing a robust, repeatable, and accurate platform for the segmentation of cardiovascular images. The end goal is to accurately reconstruct three-dimensional cardiovascular structures and output the geometry in a format suitable for subsequent meshing and computational analysis. We will also implement our technique to solve a very important problem researchers face when simulating cardiovascular biomechanics, i.e. the acquisition of 3D velocity profiles from Magnetic Resonance images.

The current research methods are often too slow or aimed at one specific application, severely limiting their potential dissemination to other groups working on similar problems. Our approach incorporates computer science techniques to create modular software that easily adapts to other researchers' needs. By assembling multiple image processing approaches in one highly effective approach through our software, we believe that we can overcome the drawbacks of previous image reconstruction protocols. Indeed, using multiple techniques maximizes the effectiveness of each technique's strength and guarantees the optimization of each single image processing task to the desired product.

Accomplishment of this project will provide a single integrated platform to reconstruct 3D cardiovascular geometries and blood velocity fields and produce accurate cardiovascular models ready to be transferred to computational solvers and to rapid prototyping equipment for the development of phantoms for experimental testing.