

Automatic Segmentation of Pulmonary Arteries from Chest Computed Tomography Images

A. Goals:

To investigate different image processing algorithms and develop an ad hoc approach that will segment automatically the pulmonary arteries from CT images.

B. Brief Description:

- There are no automatic image segmentation algorithms for the pulmonary vasculature that can be used in computational hemodynamics to assess pulmonary arterial hypertension progression.
- Manual segmentation of these complex tree structures demands a significant amount of time and the ensuing measurements of the vessel diameters and branching angles can be unreliable and user dependent.
- We are working to overcome the aforementioned limitations leading to an efficient technique to model the pulmonary vasculature.

C. Heights of Achievements this semester :

- The automatic segmentation of the lungs is done using a code in development by a collaborator at University of Florida.
- The segmented vessels can be extracted in a format compatible for generating mesh using ICEM software.
- Segmenting arteries and veins manually is work in progress.

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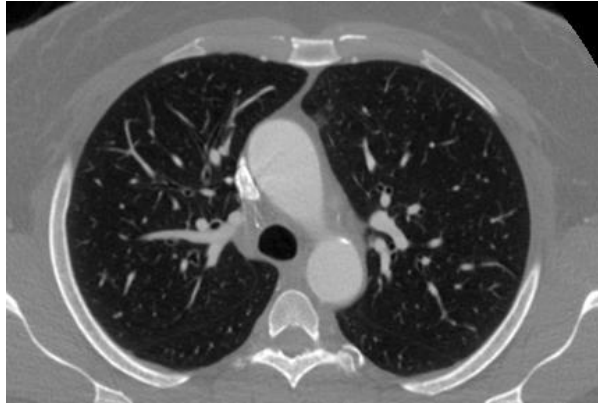


Fig 1: Input CT image

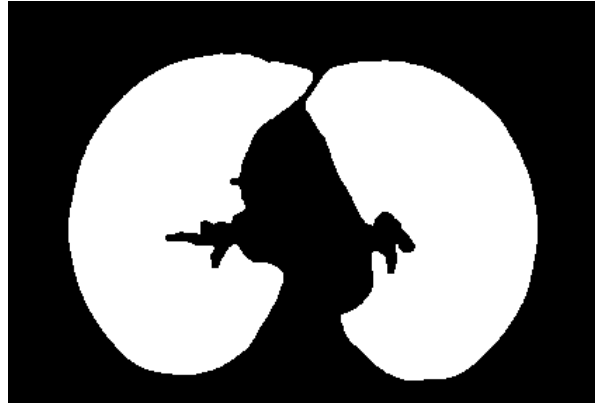


Fig 2: Segmented human lung
Mask Image

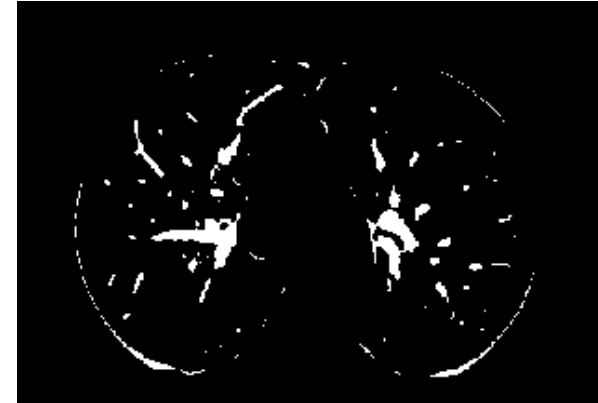


Fig 3: Threshold image
(arteries and veins highlighted)



Fig 4: Extracted artery vessels

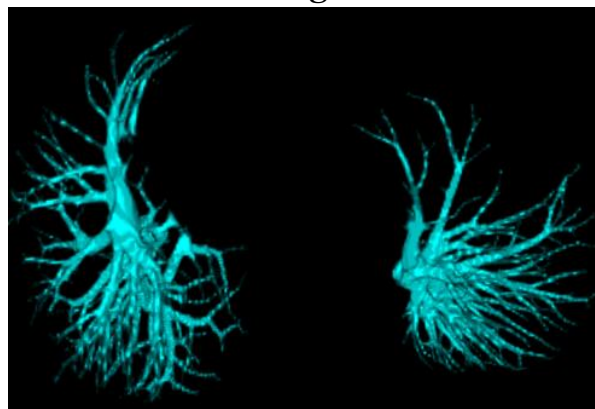


Fig 5: 3D reconstruction of extracted
pulmonary vessels

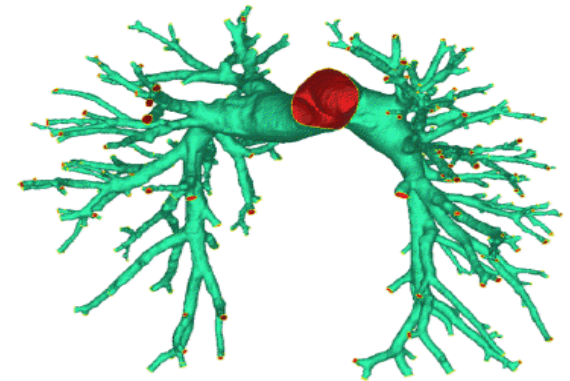


Fig 6: Expected final outcome