Assessment of morphological changes in pulmonary induced pathology: an animal study with micro-CT

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MAP5

Project team

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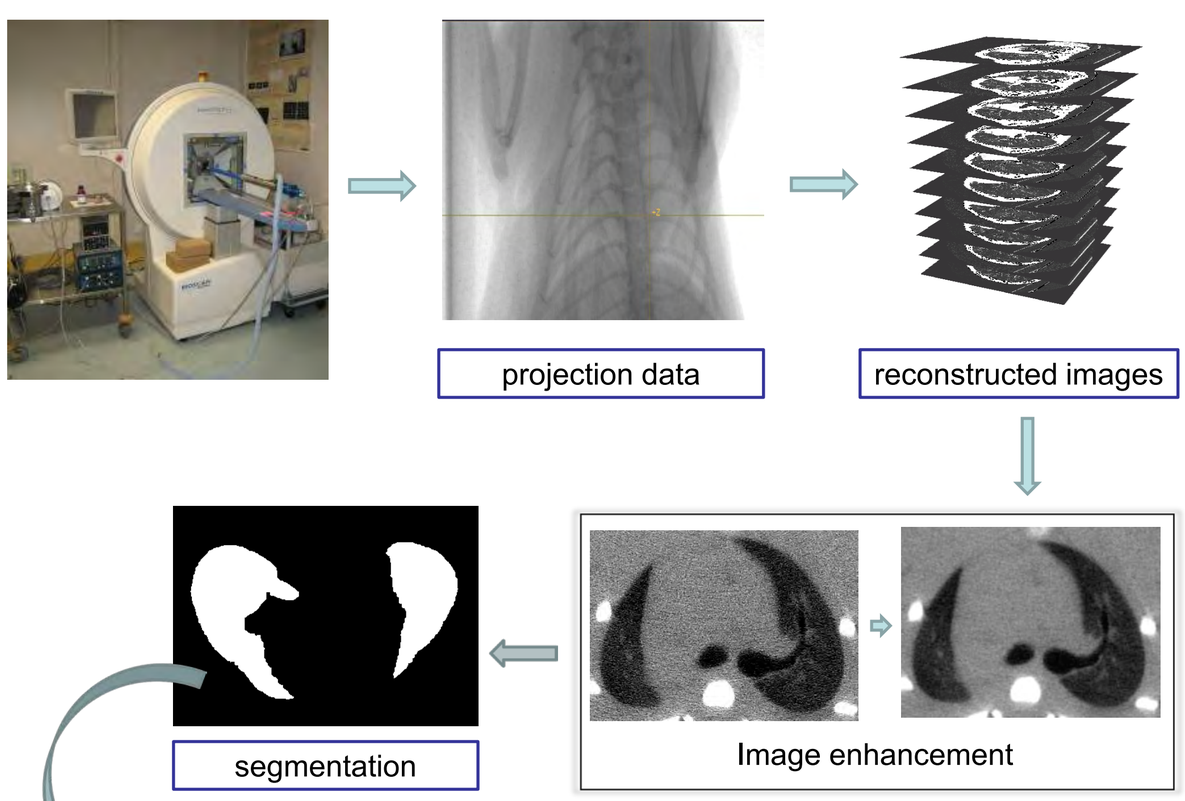
Introduction

Context

- Enable inhaled therapy quantification for two types of pathology, asthma and emphysema, with test in small animal

Objectives

- From animal images (rat) acquired with micro-CT:
  - Develop an algorithm to correctly identify the lungs and the airways
  - Create a 3D rendering model of these structures



Methods

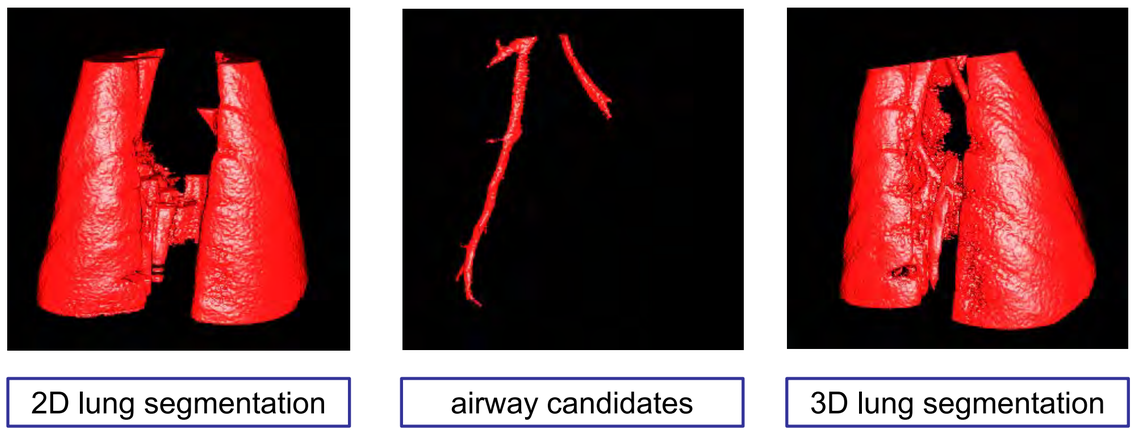
- 3D image enhancement: reducing the noise by means of filtering, preserving the borders, and choosing the best luminance range – *Gaussian and projection-filter backprojection (P-FBP) approaches*
- Lung segmentation: investigation of morphological methods performing both in 2D and 3D spaces – *grayscale reconstruction by erosion*
- Airway segmentation: 2D and 3D methods for candidates detection and distal segments reconstruction – *multi-scale connection cost and controlled region growing*
- 3D model visualization – *volume rendering*

➢ Implementation: C++ language

Achievements

3D modeling of lungs and airways in rat (2D and 3D segmentation methods):

- C++ software which correctly identifies the lungs
- C++ software which identifies the airway candidates as a starting point for future reconstruction of distal segments



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