



# Automatic 3D Segmentation of Bronchial Tree for disease prognosis of CoViD-19 patients

Project Management and Software Development  
for Medical Applications

## General Info

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## Project Abstract

Goal: **Implement a software to automatically generate a 3D segmentation of the bronchial tree from images of patients with different lung pathologies.** This will include using screening images of patients with suspicion of CoViD-19.

## Background and Motivation

In the middle of the CoViD-19 pandemic, means for fast and effective evaluation of the state of patients suspected of having CoViD-19 is desired. Current preliminary research shows that the quantification of low dose CT images may have strong prognostic information on the future development of the disease for the patients.

At Klinikum Rechts der Isar we have started a program together with the radiology department to annotate and train Deep Neural Networks for the evaluation of lungs of patients suspected to have CoViD-19. By a fast quantitative evaluation, we expect to be able to derive patients to the proper stations depending on their likelihood to develop severe symptoms.

## Student's Tasks Description

The student will have to **learn basics** of medical image segmentation, and **develop software** to implement an automatic algorithm to segment the

**bronchial tree** in low dose CT images of patients suspected of having CoViD-19.

The student will contact physicians to learn about the **lung diseases** as well as requirements for a planning software.

The student will then **implement a software** to load several screening images (low dose CT), automatically detect the bronchial tree using Deep Learning.

As a result, the student will learn basics of medical image segmentation, 3D visualization, deep learning, graphical user interfaces and **software development in a medical setup.**

## Technical Prerequisites

The student should be familiar with

- Python
- Medical image segmentation
- PyTorch (helpful)
- Deep learning knowledge (helpful)
- 3D computer graphics (helpful)

The student should be keen to invest time speaking with physicians and being present during diagnostic sessions to learn about the procedure.

## References

<https://bit.ly/2N6ApDQ> (video visualisation)

<https://www.pytorch.org/>