

# An Extended Real-Time Model for CT Segmentation with Livewire

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| Art          | Masterarbeit  |
| Arbeitstitel | An Extended Real-Time Model for CT Segmentation of the Lung with Livewire |

To quantitatively assess parameters from lung CT images such as lung volume, weight, and gas content, a precise delineation of the lung boundary is necessary in each image slice. Common complications for this task are effusions (blood or other fluids), pneumothorax (trapped air), atelectasis (collapsed lung regions) and injuries such as broken ribs. These complications have slightly different grayscale distributions, but their accurate separation is challenging even for a knowledgeable user.

In this project, a method similar to Livewire shall be developed, where a dynamic model of the “right-hand side” and “left-hand side” of the drawn boundary shall be updated in real-time. While manually delineating the lung boundary, the algorithm shall learn from a certain region around the drawing how the “left” and “right” side are composed. Then, the algorithm shall propose a continuation of the drawing, which can be accepted by the user with a “Snap To” method. A “Snap To” indicates a successful prediction, resulting in an update of the model. Similar to the original Livewire algorithm, a “cooling” of already established contours and a dynamic update of the model shall be implemented.

A prototype can be implemented in Matlab, but it is preferred to implement the method in MITK using C++. Optionally, the method can also be implemented in an iPad App using the Apple Pencil.

## Anforderungen

- Experience with image processing
- Experience with machine learning, preferably in the field of image processing
- C++ and/or Matlab
- Swift is helpful, but not required

## Kontakt

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