

DeepMedic and U-Net neuronal network architectures for lung segmentation in CT scans

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Abstract—This work examines the DeepMedic and the U-Net architectures of neuronal nets for segmentation of lung structures in computed tomography scans. The application of the algorithms will be evaluated on the LUNA16 dataset.

I. INTRODUCTION

Since hardware specifications and computational power increased dramatically in the last years machine learning approaches can be applied in various disciplines today. On top of that the progress in research on convolutional neuronal networks (CNN) made it a very powerful tool for image processing where information is gained from image data.

One challenging application is medical image computing (MIC). The main goal of MIC is to extract clinically relevant information or knowledge from medical images. Furthermore Segmentation is the process of partitioning an image into different meaningful segments (e. g. organs, bones, ...).

In this project the goal is to segment the lung of a human body from a computed tomography (CT) scans.

The used dataset is from the LUNA16 challenge [1] and each scan contains a number of slices which are 512 x 512 pixel greyscale images. The algorithm creates a 512 x 512 pixel label map for each slice marking every pixel that is part of the lung. An example of one scan and the corresponding labeling is shown in figure 1.

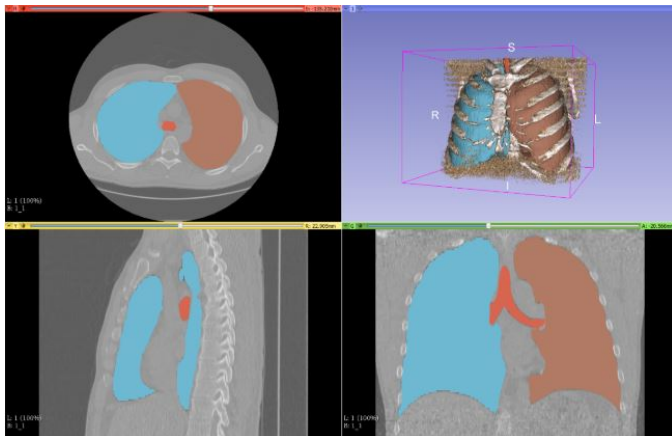


Fig. 1. CT scan of the lung and labeled parts

The segmentation of the lung from the rest of the picture is the first step for further image processing. In the LUNA16

dataset the final goal for example is to detect nodules of the lung indicating cancer. Machine learning approaches can be a powerful support for the doctors who treat patients with suspected cancer. The algorithms can reduce human errors and . It might even have the potential to outperform human capabilities and could automatizes the process of cancer detection. This could have a positive effect on health care quality and costs. In this work two different neuronal networks will be trained and tested to segment the lung on the above described dataset. Furthermore they will be examined and compared under different metrics.

First a short overview on the DeepMedic Network and the U-Net will be given and will be related to other approaches for medical image segmentation. After that the process and implementation will be explained and in the end the results of the two algorithms examined and compared. ...

II. BACKGROUND

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III. RELATED WORK

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IV. PROCESS

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V. EVALUATION

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VI. CONCLUSION

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REFERENCES

- [1] "Lung nodule analysis 2016." [Online]. Available: <https://luna16.grand-challenge.org/>