Development of a Vessel Segmentation Model via Deep Learning for the Analysis of Liver Function

Rebekka Fehling

supervised by: Prof. Dr. Jan Lellmann und Prof. Dr.-Ing. Andrea Schenk

Abstract

Vessel segmentation is an important tool in medical applications such as diagnosis, treatment delivery and prognosis formulation and evaluation. It is also a central part of the research project presented in this work, which focuses on assessing liver function in patients with primary sclerosing cholangitis based on magnetic resonance data of patients. The aim is to investigate whether an automated approach of liver function estimation can replace a manual region-of-interest-based analysis. In this context, vessel segmentation helps to obtain a segmentation of the pure liver parenchyma, leading to a more accurate computation of local liver function. This thesis presents the development of an algorithm for automatic liver vessel segmentation which can be applied within this project. Furthermore, the developed model as well as the whole workflow for liver function computation is evaluated in comparison to manual measurements. The results of the automatic approach show high correlation with the manual measurements, indicating that this is a promising approach for the analysis of hepatobiliary function.