Ausschreibung
Bachelor- / Master-Arbeit

Semi- / Self- Supervised Learning for Shapes and Segmentation in Medical Image Processing

Background
Deep Learning usually requires large amounts of manually labeled groundtruth data for successful learning. The bigger the networks become, the more data is typically required. Medical Image Analysis often requires processing of 3D data (such as MRI or CT). The networks become inherently bigger than 2D networks. Unfortunately, the medical image domain is one of the most work and cost consuming fields when it comes to labelling new data. This is due to the fact, that the data itself is already quite large and complex, but also that the annotation can only be done by medical experts.

Semi- and Self- supervised learning have the possibility to overcome these issues by learning only from a small portion of annotated and a large pool of unannotated data. There are several methods to achieve this with classification approaches on non-medical data. For medical data in general and especially for the tasks of shape fitting and semantic segmentation there are almost no feasible approaches.

Tasks
• Developing semi- and/or self-supervised methods for medical image analysis
• Implementation of the developed algorithms
• Validation of different datasets.

Your Profile
• Experience in Programming (preferably Python)
• Strong statistical background
• Prior experience with deep learning is a plus
• Prior experience with medical images is a plus

Our Offer
We offer a thesis in a rapidly evolving and relevant research area. Our institute employs the most modern IT-Infrastructure (including our own GPU-Cluster for deep learning only). During the thesis you will familiarize yourself with the characteristics and challenges of 3D medical data as well as with deep learning for segmentation and shape fitting.