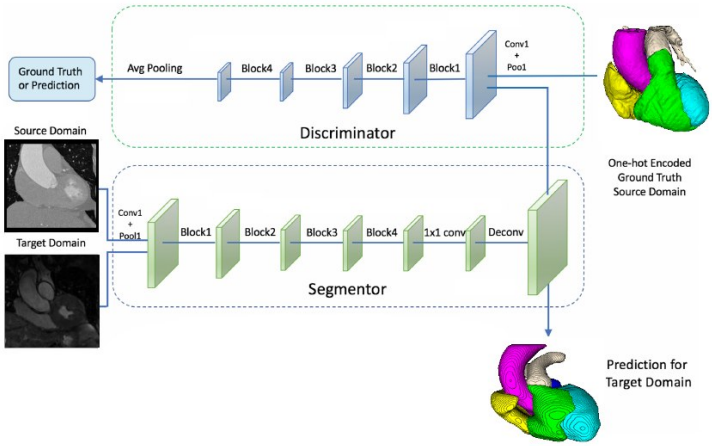
*Medical Imaging and Biometrics Group*
*Institute of Computer Graphics and Vision*
*Graz University of Technology*

# *Semi-Supervised Multi-Label Whole Heart Segmentation*

## *Master's Thesis/Project*




### *Description:*

Deep learning boosted the state-of-the-art in many computer vision and medical imaging tasks. Unfortunately, deep convolutional neural networks (CNNs) require lots of data to be trained successfully and deliver good performance. Especially in the medical imaging domain, obtaining large annotated datasets is not only difficult due to financial and ethical reasons, but also due to demanding annotations from medical experts.
Semi-supervised learning is a way of alleviating the requirement of lots of annotations, by also using information from images, where no annotations are available. The goal of this project is to apply semi-supervised learning techinques for semantic segmentation problems, specifically for multi-label whole heart segmentation. For this project, the student has to do a literature overview of semi-supervised semantic segmentation using CNNs in the medical imaging domain and to implement and compare various semi-supervised learning methods, e.g., using generative adverserial networks (GANs) to regularize the predicted segmentations.

### *Objective:*

- Perform literature review on semi-supervised learning and related topics.
- Train and test CNN based approaches to solve this problem.

### *Qualification:*

- Interested in machine learning and computer vision
- Preferably knowledgeable with Python and TensorFlow

### *Literature:*

Yang et al., Unsupervised Domain Adaptation for Automatic Estimation of Cardiothoracic Ratio, International Conference on Medical Image Computing and Computer-Assisted Intervention, 2018
Payer et al., Multi-Label Whole Heart Segmentation Using CNNs and Anatomical Label Configurations, International Workshop on Statistical Atlases and Computational Models of the Heart, 2017

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