

Master thesis 2018

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Segmenting tubular structures in the pancreas using deep learning

There is a biological hypotheses that during pancreatic differentiation, the structure of the tubular lumen network (in which the cells are situated) dictates which surrounding cells are turning into beta cells. Finding these structures so they can be studied, is the first step in proving this hypothesis. For this analysis, five 3d films of the pancreas development have been recorded on mice, and have been annotated with some labels in preparation for this study.

The purpose of this MSc project is to segment the tubular lumen network from the film using the deep learning library tensorflow.

Project objectives and timeline

- Explore the data, and fix errors in the dataset
Deadline 15.3
- Segment the images using a CNN with the given set of annotated labels.
Deadline 30.4
- Try different preprocessing methods (Normalization, filtering) and record the impact.
Deadline 30.6
- Try different semisupervised learning techniques to include unlabeled data in analysis.
Deadline 15.5

Learning goals

- Implement a CNN classifier for image segmentation using tensorflow

- Implement Augmented CNN in a semisupervised fashion using the unlabeled data
- Test improvements of segmentation when preprocessing

Risk

The data have already been shown to include some errors, so these have to be fixed or removed before segmentation. There is also a possibility, that more images needs annotations.