

# Tumor segmentation of prostate carcinomas on microscopy images

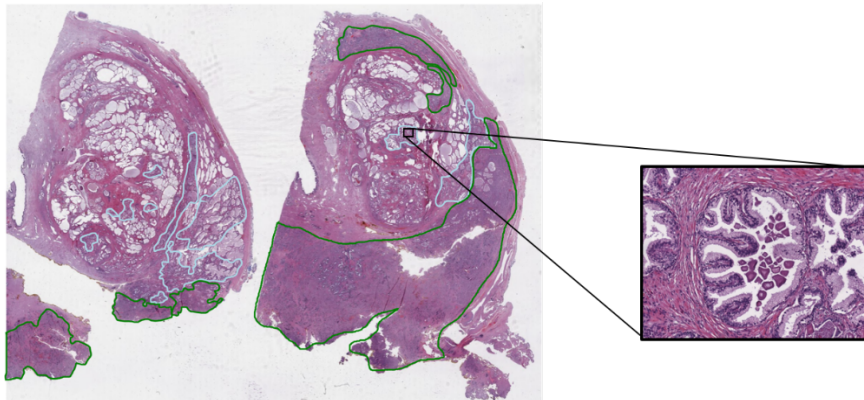
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Biopsy is the gold standard for cancer diagnosis (1). Before the advent of fast digital microscopy scanners, the inspection of tissue slides under a microscope has been a typical method in histopathology. Today, aforementioned scanners are used to digitalize tissue slides into so called whole slide images (WSI). Thanks to their enormous resolution of between  $20,000^2$  pixels and over  $100,000^2$  pixels, WSIs allow a very detailed representation of the tissue (1,2). Manual diagnosis of WSIs is a time-consuming and error-prone task, which is why computer-assisted diagnosis of tissues in WSIs is an active area of research.

One area of computer-aided diagnosis on WSIs is the semantic segmentation of tissue according to different tissue types or into different diagnostic categories, such as tumor tissue (3). Such a segmentation is to be carried out for a data set of tissue sections of prostate tumors recorded within the framework of a research project with Klinikum Ingolstadt and Pathologie Ingolstadt.

The thesis comprises the following tasks:

- Literature review of the state-of-the-art of semantic segmentation of tumor tissue in microscopy images
- Development of a pipeline for preprocessing and segmenting the images (preferably in python)
- Evaluation of the implemented methods
- Documentation of the code and used methods



Annotations of different tissue types on a WSI (left) and sizes example for high resolution of the WSI

1. Cheng Li et al. (2021) "A State-of-the-art Survey of Artificial Neural Networks for Whole-slide Image Analysis:from Popular Convolutional Neural Networks to Potential Visual Transformers."
2. Qudoc Dang Vu et al. (2019) "Methods for Segmentation and Classification of Digital Microscopy Tissue Images." in *Frontiers in Bioengineering and Biotechnology*, vol. 7
3. Lyndon Chan et al. (2019) "HistoSegNet: Semantic Segmentation of Histological Tissue Type in Whole Slide Images." in *Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV)*