Deep learning for vascular segmentation and tissue characterization in CT images

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Stellingen behorende bij het proefschrift getiteld

Deep Learning for Vascular Segmentation

and Tissue Characterization in CT Images

1. Image processing techniques used for atherosclerotic plaque detection should be capable of describing both the composition and location of plaques. - Chapter 2.
2. Introducing an explicit vascular graph can help the model better capture irregular and long-range vessel connectivity. - Chapter 3.
3. A top-k MIP (Maximum Intensity Projection) preserves the k highest intensity values along any given direction, thereby encoding the fine-grained 3D structure of the vessel tree. - Chapter 4.
4. The liver vessel prior used for Couinaud segmentation can be replaced with learnable implicit contextual information. - Chapter 5.
5. Hounsfield unit (HU) based differentiation of plaque components is unreliable due to the significant overlap of mean HU values of lipid-rich and fibrous plaques. - *The International Journal of Cardiovascular Imaging. 2016 Jan; 32(1): 161-72.*
6. An accurate delineation of the vessels is a crucial step to define an accurate segmentation of the liver segments. - *Journal of Digital Imaging. 2020 Apr;33(2):304-23.*
7. Maintaining the connectivity and topological structure of the segmented blood vessels is a clinical and human experience requirement, which should be considered in the design of the blood vessel segmentation algorithm. - *IEEE Journal of Biomedical and Health Informatics. 2021 Oct 6; 26(3): 1251-62.*
8. In dense prediction tasks, capturing relations between all pairs of pixels is usually unnecessary due to the redundant information contained within the image. - *IEEE Transactions on Pattern Analysis and Machine Intelligence. 2023 May; 45(5): 5712-5730.*
9. A fancy model is for research; a simple model is for real-world use.
10. Open-source data and code play a positive role in advancing technology.