Aalto University

Dissertation press release **20.11.2020**

AI can help to cure cancer in radiotherapy by automatically segmenting organs on CT images

Title of the dissertation	Clinical Applicability of Deep Learning for Organ-At-Risk Segmentation in Radiotherapy Planning
Contents of the dissertation	With the number of cancer cases rising globally, there is an increasing need for automation in the treatment planning process. This dissertation evaluates the clinical applicability of automatic organ delineation for radiotherapy planning and gives evidence that deep learning can be used to a) reduce the time spend for organ delineation, b) performs on par with clinical practice for the male pelvis on cone-beam CT and c) generalises to other institutions in most cases. For this, we developed a state-of-the-art deep neural network that can segment organs-at-risk in the female breast, female pelvis and male pelvis region. We then measured the time needed to correct the resulting structures and compared these to the delineation from scratch. Further, doctors were scoring structures produced by our deep neural network and those originating from clinical practice in the male pelvis. Here, we could see that the scores for the neural network are equal or better. Finally, we compared how the neural network performs on patients from clinics that were not present during the training of the neural network. This provides guidance to which extend neural networks developed by a third party can be readily applied in clinical practice. Here, we see that, for the inner organs tested, the network performs well as long as the contouring practice is coherent.
Field of the dissertation	Biomedical Engineering
Doctoral candidate	Jan Schreier, M.Sc.
Time of the defence	20.11.2020 time 12pm
Place of the defence	Online
Opponent	Professor John A. Lee, Université catholique de Louvain, Belgium
Custos	Professor Lauri Parkkonen., Aalto University School of Science, Neuroscience and Biomedical Engineering
Electronic dissertation	http://urn.fi/URN:ISBN:978-952-64-0073-0
Doctoral candidate's contact information	Jan Schreier, jan.schreier@aalto.fi, 041 7420632