The Value and Challenges of Radiomics Artificial Intelligence for Magnetic Resonance Based Prostate Cancer Imaging

Bleker, Jeroen

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university of groningen

Propositions accompanying the dissertation

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By

Jeroen Bleker

An in-house developed radiomics model to assist the radiologist in the visual assessment of peripheral zone prostate cancer on MRI can be useful if used on data homogeneous with the model development data. (Ch.2)

Clinical implementation of radiomics AI to support the radiologist in visual assessment of peripheral zone prostate cancer on MRI could help reduce study costs and time due to the omission of the dynamic contrast enhanced sequence. (Ch.2)

Prostate cancer radiomics AI models developed on single-center MRI data should not be relied on when making predictions on new heterogeneous data. (Ch.3)

Multi-center developed radiomics AI models can be used with new heterogeneous MRI data to make predictions about the clinical significance of a prostate lesion. (Ch.3)

Encouraging data sharing and extensive documentation regarding reproducibility and clinical utility should be main focusses for the development of clinically useful radiomics models that can assist or outperform radiologist in diagnosing clinically significant prostate cancer on MRI. (Ch.4)

A reproducible and structured segmentation approach such as the deep learning masked auto-fixed volume of interest can add major value to a radiomics based AI approach for prostate cancer diagnosis on MRI in the form of increased model performance and reduced placement time. (Ch.5)

Development of multicenter radiomics AI for MRI should include image resampling with an experimental optimization step to find the best pixel dimensions and interpolation algorithm. (Ch.6)

"Remember that all models are wrong; the practical question is how wrong do they have to be to not be useful." Empirical Model-Building and Response Surfaces G.Box & N Draper

"People worry that computers will get too smart and take over the world, but the real problem is that they're too stupid and they've already taken over the world" The master algorithm – Prof. P. Domingos

"We can build a much brighter future where humans are relieved of menial work using AI capabilities" Andrew Ng