Deep learning-based cone beam CT correction for adaptive proton therapy

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Propositions

associated with the PhD thesis

Deep learning-based cone beam CT correction for adaptive proton therapy

by Adrian Thummerer

1. Deep learning based synthetic CTs are superior to other CBCT correction methods, such as deformable image registration and analytical image-based correction.

   This Thesis

2. The comparison of CBCT- and MR-based synthetic CTs showed that deep convolutional neural networks are highly flexible to various input image modalities.

   This Thesis

3. The clinical implementation of synthetic CTs requires stringent quality control processes to ensure highly accurate and reliable images.

   This Thesis

4. Publicly available datasets are essential for a fair and meaningful comparison of deep learning-based CBCT correction approaches.

   This Thesis

5. CBCT-based synthetic CT imaging will enable online daily adaptive proton therapy.

   This Thesis

6. The generation of 4D-synthetic CTs from sparse view 4D-CBCTs demonstrates the general ability of neural networks to extract useful information from highly deteriorated images.

   This Thesis

7. The key to further diffusion of deep learning-based synthetic CT techniques is evaluating their generalization capability in a multicenter setting.

   Spadea and Maspero et al.

8. Freedom is something that dies unless it‘s used.

   Hunter S. Thompson

9. Whoever is happy will make others happy too.

   Annelies Marie Frank