



Universiteit  
Leiden  
The Netherlands

## Deep learning for online adaptive radiotherapy

Elmahdy, M.S.E.

### Citation

Elmahdy, M. S. E. (2022, March 15). *Deep learning for online adaptive radiotherapy*. Retrieved from <https://hdl.handle.net/1887/3278960>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/3278960>

**Note:** To cite this publication please use the final published version (if applicable).

Stellingen behorend bij het proefschrift getiteld

# **Deep Learning for Online Adaptive Radiotherapy**

door **Mohamed S. Elmahdy**

1. The performance of existing conventional iterative-based image registration algorithms can be improved by incorporating anatomical constraints to the optimization algorithm (Chapter 2).
2. Deep learning models can be trained to leverage personalized anatomical knowledge accumulated over the treatment sessions for a specific patient (Chapter 3).
3. Generative adversarial networks have the ability to learn their own misalignment metric without the need to predefine one (Chapter 4).
4. Segmentation and registration are correlated tasks and joining them via the network architecture as well as loss function can boost the performance of both (Chapter 5).
5. A conventional compressed sensing algorithm can be replaced by a trainable CNN network, which achieves better visual results in less than a second (Chapter 6).
6. Automatically generating accurate and robust delineations is critical to reach the goal of adaptive radiotherapy, but only one of the necessary steps.
7. It is not just the size of the dataset that matters, but more importantly its quality and diversity.
8. Multi-task learning is the form of automatic learning that most closely models how physicians learn in real-world scenarios.
9. Deep learning based emerging technologies can change the face of healthcare and make it more accessible to developing countries.
10. A scientist should criticize everything he reads in order to push the science forward by either approving, reinterpreting, or refuting it.