Company: Catharina Ziekenhuis Eindhoven
Project: Design of an automated process for creating breast cancer treatment plans, with Artificial Intelligence
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Radiotherapy treatment planning is a time-consuming and iterative process. Currently, target volumes and surrounding organs are delineated manually on CT scans. Afterwards, a treatment plan is created which contains the dose distribution to be irradiated, which is a trade-off between enough dose to the target volumes and sparing of healthy surrounding organs. Artificial Intelligence can be used to automate both processes.

In this project, two AI models were developed and clinically validated for breast cancer patients. A model to automatically delineate target volumes (breast and lymph nodes) and surrounding organs (heart, lungs, esophagus, humerus and thyroid) has shown to reduce time by an average of 40% (8 minutes) to almost 60% (25 minutes) for respectively organs and target volumes, including manual adjustments by the medical professional when needed. A second model to predict the dose distribution resulted clinically acceptable treatment plans in 95% of the cases, showing time efficiency when compared to manual treatment planning.

During the runtime of the project, the auto-planning model (automatic dose prediction) was successfully implemented in clinical practice. The auto-segmentation model (automatic delineation) was clinically implemented shortly after. Currently, both models are already successful used in the treatment of over 50 patients. ▪