

**Purpose:** The purpose of this work was to create prospective treatment plans based on anatomical feature matching to previously treated cases from the institution database. This tool recommends ideal treatment plans to clinicians and provides quality control (QC) of the plan generation process to ensure best practices based on past planning experiences.

**Methods:** An image-based and feature-selection search engine (RT-Analytics) was implemented that explores previously treated cases of similar anatomy, returning a list of suggested plan configurations and corresponding DVHs. The search is based on a multi-modality image registration to match isocenters and with the dose matrix used as mask to focus the registration on the tumor and surrounding tissue only. Plans ordered by anatomical similarity, are presented to the clinician and are exported to the treatment planning system to be used as a starting point in the treatment planning process.

**Results:** RT-Analytics is demonstrated on ten clinical cases of breast carcinomas. Using an institutional database of 317 previously treated cases, the search procedure finds anatomical matches at a value of 0.9 or higher as measured by a mutual information metric computed over 30 histogram bins. Without re-optimizing the treatment plan, dose homogeneity in the breast was within 12%. Minor changes needed to further decrease this inhomogeneity, and the previous optimization constraints and attained DVH can be used as a starting solution in the optimization process. Suggested solutions are also used for quality assurance purposes, to investigate if the attained DVH on new cases meet the quality of previous cases using a population-based plan assessment.

**Conclusions:** RT-Analytics represents a unique approach to plan generation by using prior planning solutions, and it allows quality control of the plan development process.