AbstractID: 11388 Title: A clinical evaluation of the m-rep-based automatic prostate segmentation

Purpose: To evaluate the clinical application readiness of a statistically trainable deformable shape model, called an m-rep, for automatic segmentation of the prostate from CT images by comparison with manual contouring.

Method and Materials: ConStruct, an in-house automatic prostate segmentation tool featuring m-rep (medial representations) models, was used in this study. This study is to test the robustness of the m-rep models for prostate treatment planning segmentation in routine use. For each patient case, an m-rep was initialized and automatically deformed to segment the prostate. Ground truth was taken to be the contour set used for treatment planning. Two radiation oncologists each manually created an additional contour set. The average distance between m-rep segmentation (or manual segmentation) and the ground truth was calculated. Retrospective clinical validation was also carried out in all cases. Two radiation oncologists blindly scored all the contour sets including the ground truth. Score 1: perfect contour—no corrections needed; 2: minor correction—less than one third of the slices require correction; 3: major correction—more efficient than redrawing all the contours from scratch; 4: not acceptable.

Results: Averaged over five patients, the average distances between m-rep, set 1 and 2 manual contour sets and the ground truth are 0.51, 0.45, and 0.42 cm, respectively. The average scores for m-rep, set 1, set 2 contour sets, and the ground truth are 2.4, 2.4, 2.0, and 2.1, respectively.

Conclusion: The qualitative and clinical validations were performed on m-rep-based automatic segmentation by comparing it to manual contouring. M-reps appeared to produce reasonable and acceptable prostate contour sets when compared to those generated by clinicians. We propose that m-reps be used to improve clinical efficiency by automatically contouring the prostate as a starting shape and then manually editing when needed. Further validation on a larger patient cohort is indicated.