

AbstractID: 4663 Title: Automated prostate contour drawing on post-implant CT images based on ultrasound volume and seeds positions

Purpose :

It is difficult to locate precisely the prostate on CT images. We propose an automated contouring help method based on data acquired during intra-operative brachytherapy procedure. The algorithm uses ultrasound volume and seeds positions to draw a preliminary contour on CT image.

Method and Materials:

The data acquired during the clinical protocol are the intra-operative ultrasound volume and the seeds positions based on the detected needle insertion, and the seed positions and the CT images thirty days post-implant. In the first step the US volume and seed cloud are matched. For each z position of a clinical CT image, the US contour and seeds are extracted. The seeds positions are automatically detected on CT image and are used to calculate a transformation matrix to translate the seeds positions from day 0 to 30. The contours are reshaped using active contour. The reshaping process begins with the center slice and progress on both sides. The active contours are initialize with an expanded US volume.

Implementation (results) :

There are no parameters to adjust in the first part of the algorithm. In the second part, there are six snakes parameters : continuity, curvature, convergence, gradient contraction minimum and contraction maximum. There is also a parameter controlling the resize factor of the US contours. The preliminary tests are conducted on ten clinical cases. Most of the contours were the final contour. The others needed a small physician action to correct the contours.

Conclusion:

This algorithm will be a useful tool to help physicians in tedious work to draw prostate contours on CT images. This automated approach presents the physician with intra-op US volume fused to the 30 days CT exams and proposes a new set of contours based on the morphology of the seed distribution.