AbstractID: 1558 Title: Automatic Re-contouring Regions of Interest based on Deformable Registration and Surface Reconstruction

Re-contouring regions of interest (target or sensitive structures) on each fraction (stage) of treatment image is the one of the most challengeable tasks in adaptive radiotherapy or 4-D planning. The requirement of manually re-contouring prevents re-optimization and /or planning modification being done routinely. An automatic re-contouring technique is presented, which could reduce or even eliminate such obstacles.

This method is based on the fast and accurate deformable registration algorithm and surface reconstruction technique. The regions of interest are contoured manually or semi-automatically in the reference image. The reference surfaces are built based on these planning contours using a triangle surface reconstruction technique. The deformable registration technique provides the displacement map between the reference image and test image. The vertices of the reference surface are displaced in accordance with the displacement map, which results in the test surfaces. The test contours are reconstructed by cutting the test surface slice by slice.

Tests on the 4-D CT images of a lung patient are presented. Experiments show that this technique re-contours the regions with large deformation or large displacement quite accurately. This technique also provides a metric to evaluate the deformable registration algorithms.