

AbstractID: 3774 Title: Comparison of auto-contouring with manual contouring: A first step towards automated 4D treatment planning

Purpose:

Four-dimensional (4D) radiotherapy is the explicit inclusion of the temporal changes in anatomy during the imaging, planning and delivery of radiotherapy. One key component of 4D radiotherapy planning, is the ability to auto contour the individual respiratory phase CT datasets (up to ten in total) comprising a 4D computed tomography (CT) scan. A tool that can be used to automatically generate such contours (based on contours manually drawn on a single CT phase) is deformable image registration. The purpose of the current study was to compare automatically generated contours with manually drawn contours.

Method and Materials:

Two out of ten patient 4D CT data sets have completed this study. The 4D CT scans consisted of a series of ten 3D CT image sets acquired at different respiratory phases. Large deformable diffeomorphic image registration was performed to map each CT set from the peak-inhale respiration phase to the CT image sets corresponding with subsequent respiration phases. The calculated displacement vector fields were used to deform contours defined on the peak-inhale CT automatically to the other respiratory phase CT image sets. Auto-contouring was performed on each of the ten 3D image sets via automated scripts. Treatment planning system, Pinnacle version 7.7 was interfaced with automated scripts to view the resulting images and to obtain the volumetric and displacement information.

Results:

Deformation with respiration was observed for the lung tumor and normal tissues. This deformation was verified by examining the mapping of high contrast objects, such as the lungs and cord, between image sets.

Conclusion:

An automated system is established to auto - contour the ROI 's starting form the ROI's in the inhale phase to the other phases of the respiratory motion using Pinnacle Treatment planning system. Auto-contoured organs and the GTV in the Thorax agree with the manually drawn ROI's.