AbstractID: 1681 Title: Fast Segmentation of Pulmonary Tumors by Contour Propogation in 4DCT

4D Computed Tomography provides time-resolved volumetric information about respiratory organ motion. To incorporate organ motion based on 4DCT data into radiotherapy treatment planning, target contours are needed for each of the typically 10 volumes in the dataset. For routine use, the increase in workload to contour 10 volumes is unacceptable. We propose a method for quickly segmenting lung tumors across 4DCT datasets. Our method provides a quick automatic propagation of expert knowledge marked on one volume in a 4DCT dataset onto the volumes at different respiratory phases. It is difficult to automatically determine the boundary between pulmonary tumors and adjacent tissues with similar densities such as the lung wall and vascular structure. However, given one hand-marked contour in the initial scan, our method can account for the respiration-induced motion and deformation of the tumor in sequential scans. Segmentation is achieved using a rigid registration of tumor contours to lung surfaces. Low-level morphological operators are applied to account for non-rigid deformations. Using our method, contours can be propagated within minutes between different respiratory states. We compare our approach to a non-rigid intensity based registration method and report promising segmentation results.