

AbstractID: 8793 Title: Semi-automatic structure delineation using deformable image registration

Purpose:

To determine the applicability of the semi-automatic organ and tumor contouring method based on the elastic registration of CT images

Method and Materials:

Five CT scans of thorax used for treatment planning of lung cancer patients were employed for this study. The GTV and esophagus were the structures of interest. The CT slice where a structure first appears is manually contoured and the last slice with the structure is identified. The initial contour is cascaded to the last slice via a consecutive image registration. The method uses the space-zooming technique based on the Gaussian pyramid. The deformation field obtained at a given pyramid level is interpolated to the next level using B-splines. The deformed images are interpolated by means of backward reconstruction. The image registration is based on an image differential optical motion estimation. The software is implemented in C programming language. The data are extracted from dicom files with Matlab scripts.

Results:

Ideally the initial slice with a structure of interest is delineated and the method allows to complete the entire volume automatically up to its final Ct slice. For cases with a significant structural change between slices like volume partitioning, a human intervention is required to contour the problematic cross-section. The contours migration was deemed to provide acceptable results. The final inspection and contour examination of the entire volume is still required to validate structures. The robustness of the method for average case might be tuned with with algorithm's parameters .

Conclusion:

The described method works for cases for which there is no drastic topological change between slices of the structure of interest. The method deals with cases for which threshold-based segmentation techniques have difficulties due to similar values of CT numbers of the adjacent structures.