

AUTOMATIC SEGMENTATION BASED ON DEFORMABLE IMAGE REGISTRATION

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ABSTRACT

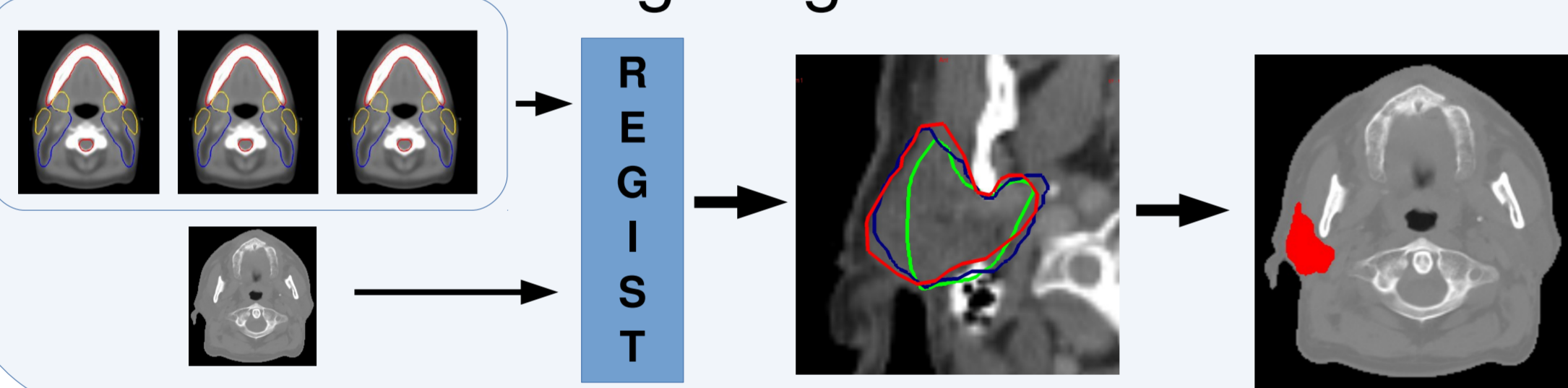
The aim of my project is to investigate the impact of automatic segmentation in several clinical scenarios. The proposed strategy is based on deformable image registration technique, in order to integrate different information available in different images.

The strategies have been developed for radiotherapy and for neuroscience applications. Most of the new features have been included in Plastimatch (www.plastimatch.org), an open source software for deformable image registration that offers also several tools for segmentation. In this poster, some applications with the relative results are shown.

Multi atlas based segmentation

Description

Segmentation of patient's structures of interest using a set of atlases and deformable image registration



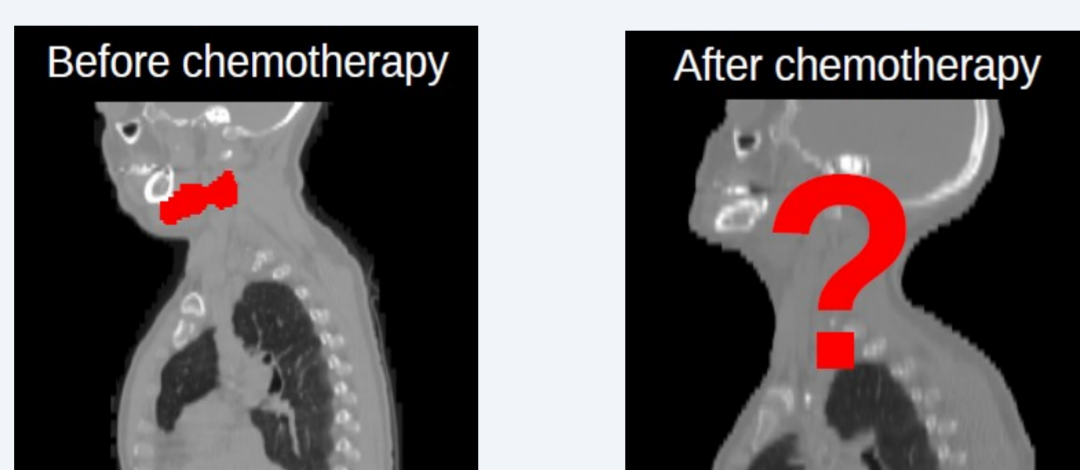
Results

18 digital atlas (CT) have been included in this study and 3 structures have been investigated: brainste (BS) and left/right parotid glands (LP/RP). Atlas selection strategy has been used in order to speed up the process. Dice coefficient similarity was 0.85 for BS and 0.83 and 0.78 for LP and RP. 22 minutes are required to get the contours.

Hodgkin lymphoma

Description

Automatic localization of tissues to treat with radiotherapy by means of diagnosis PET/CT and deformable image registration



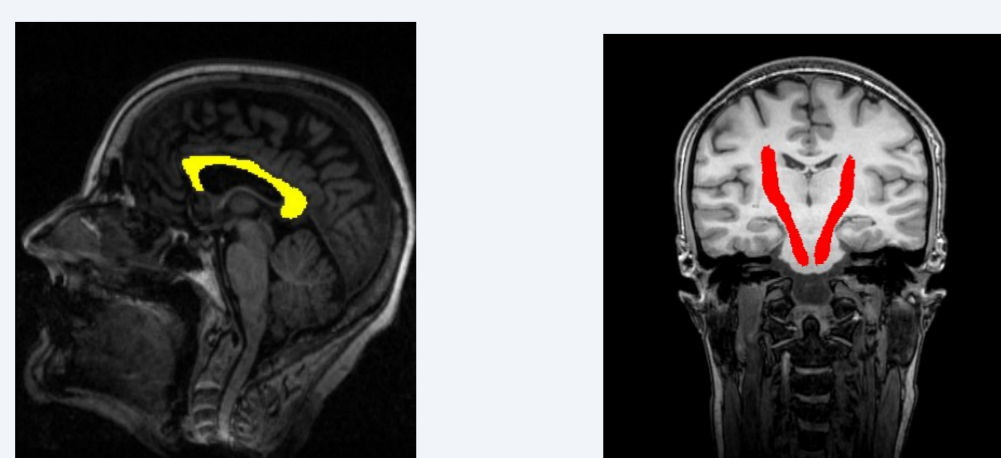
Results

15 patients having head and neck lymphoma have been used. 5 physicians scored the automatic contour of the tumoral site. The mean visual score is equal to 4 over 5. Mean dice similarity coefficient of organs at risk was 0.80 ± 0.07 (median \pm quartiles). The dosimetric analysis shows also a good performance of the proposed algorithm.

White matter fiber segmentation

Description

White matter fiber parcellation combining the information coming from structural and diffusivity MRI and spatial probability map



Results

130 healthy subjects have been included in this study. Corpus callosum and corticospinal tracts have been segmented on T1 images, ensuring the highest spatial resolution. Few minutes are required to segment each tract. The physicians' visual score of the automatic segmentations shows the effectiveness of the proposed strategy.