

User-assisted segmentation of tomographic images

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1. Introduction

Because automated methods that segment tomographic (medical) images often involve errors, editing tools that can rapidly correct the errors are needed. The editing tools presented in this paper may be considered a part of a postprocessing operation that evaluates the accuracy of an automated segmentation and refines the errors.

2. Methods

Given an initial segmentation obtained by an automated method, an environment that enables interactive 3D Region of Interest (ROI) correction of local errors is introduced. The initial segmentation is represented by a parametric surface and the surface is overlaid within the image volume. Orthogonal cross-sections are then displayed and the user is provided with tools to locally displace the surface and refine the segmentation result.

3. Results

The developed editing tools have been tested and optimized for segmentation of CT chest images and MR brain images to rapidly delineate tumors and different organs. Experiments show that once an initial segmentation in the form of a volumetric region is provided, editing of the region to remove the errors takes from a few to several minutes depending on the complexity and size of the region and the severity of the errors.

4. Conclusions

Because automated segmentation methods applied to medical images do not always extract subvolumes correctly, effective tools that can quickly refine segmentation results are needed. Tools for representing and editing 3-D regions are presented. With these tools a user can deform a 3-D region representing an initial segmentation involving some errors to one that represents the final correct segmentation as judged by the user. The tools work with volumetric images rather than with image slices. As a result, the editing process is quick and effective. Typically, editing of a 3-D region requires from a few to several minutes depending on the complexity of the region and the severity of errors.

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