

Abstract submission

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1 Software Exhibit communications

1.1 Purpose of the software

We developed a tool for the non-commercial version of OsiriX called iSix (Image Segmentation in OsiriX). This tool allows the user to create a segmentation from DICOM images with different labels and obtain for each one statistical information of voxels in the label. Also, the user can navigate through the segmented volume using 2D and 3D visualisation. We exemplify the use of our tool on the segmentation of spinal muscles, for which the tool also computes the muscle composition (fat/lean-muscle proportion) automatically.

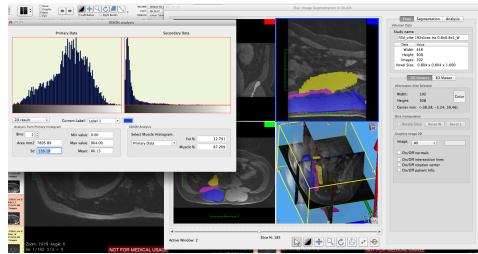


Figure 1: iSix

1.2 Software

1.2.1 Methods and Implementation

The tool works on MRI images and allows the user to work on standard (axial, sagittal, coronal) and user-defined plane orientations. In addition, using the output segmentation and DIXON images the tool computes the percentage of fat/muscle. For this we have implemented and extended the work of [1] to operate in 3D. This information can be used on clinical analyses to

find correlations between disease and fat % in the muscle (e.g. sarcopenia), and also for mechanical simulations of muscles.

Currently the iSix tool is available as a plug-in for OsiriX, which enables users to easily install it and make use of all functionalities available in Osirix. However, the architecture of the tool would enable us in the future to make it available to Linux and Windows users.

In this version of the plugin we implemented three type of segmentation algorithms:

- Region growing (semi-automatic): Implemented using the ITK library [3].
- Livewire (semi-automatic): here we use the algorithms developed in [2].
- Manual segmentation: We included two features, (1) Brushes to draw and erase with the mouse, (2) segmentation through closed polygons created by mouse clicks.

Furthermore, segmentations on an specific slice can be propagated as an stencil to other slices and edited in place, reducing the manual work.

1.3 Features illustrated at the exhibit

At the exhibit we will show the full software running on a Mac Machine. Here the audience will see the 2D and 3D visualisation of segmented muscles and we will show how to use the interface to perform segmentation and automatic quantification of fat/lean-muscle content.

References

- [1] Michael A Fischer, Daniel Nanz, Ann Shimakawa, and Gustav Andreisek. Quantification of Muscle Fat in Patients with low Back Pain : Comparison of Multi-Echo MR Imaging with Single-Voxel. *Radiology*, 266(2):555–563, 2013.
- [2] Steven Marx and Chris Brown. Progressive Livewire for Automatic Contour Extraction. In *Western New York Image Processing Workshop*, page 6, 2000.