

Basics of Data Loading and 3D Visualization in 3D Slicer

Author: Sonia Pujol, Ph.D.

Overall Goal

This tutorial is an introduction to the basics of loading and viewing DICOM images and 3D models in 3D Slicer.

Learning Objectives

- Following this tutorial, you will be able
- to load and visualize DICOM images in Slicer
- to perform volume rendering of CT data
- to load and visualize 3D models reconstructed from MRI data

Tutorial materials

- 3D Slicer version 5.10
- 3D VisualizationDataSet.zip

Tutorial dataset

The file 3DVisualizationDataset.zip contains two directories:

- dataset1_Thorax_Abdomen
- dataset2_Head

Unzip the file 3DVisualizationDataset.zip on your computer to access the datasets

Disclaimer

- 3D Slicer is a free open source software application distributed under a BSD style license.
- The software is not FDA approved or CE-Marked, and is for research use only.

Tutorial Outline

Tutorial Outline

- Part 1: Loading and Viewing DICOM data
- Part 2: Volume Rendering
- Part 3: Loading and Viewing 3D models

Part 1: DICOM Data Loading

Loading a DICOM volume



Loading a DICOM volume



Visualizing DICOM images



Visualizing DICOM images



Visualizing DICOM images



Visualizing DICOM images



Visualizing DICOM images



Visualizing DICOM images



Visualizing DICOM images



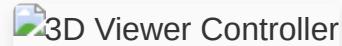
Visualizing DICOM images



Visualizing DICOM images



3D Viewer Controller



3D Viewer Controller

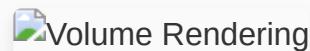


Part 2: Volume Rendering

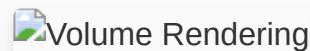
Volume Rendering

- Volume rendering techniques enable 3D visualization of 3D datasets
- The Volume Rendering module in Slicer enables interactive 3D visualization of DICOM images

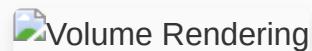
Volume Rendering



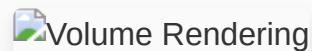
Volume Rendering



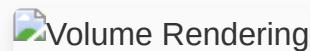
Volume Rendering



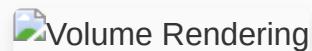
Volume Rendering



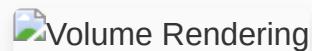
Volume Rendering



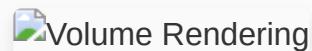
Volume Rendering



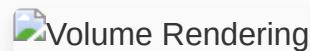
Volume Rendering



Volume Rendering



Volume Rendering



Part 3: Loading and viewing 3D models

Tutorial dataset

- The directory dataset2_Head contains the Slicer scene called Head_scene.mrb
- The scene contains 3D models from the SPL brain atlas developed by the department of Radiology at Brigham and Women's Hospital, Harvard Medical School (NIH P41 RR013218, NIH R01 MH05074)

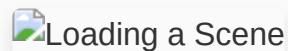
Slicer Scene

Slicer stores all loaded data in a repository called a scene

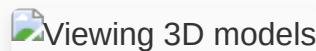
Each data set, such as an image volume, surface model, or point set, is represented as a node in a Slicer scene.

All Slicer modules operate on the data stored in a Slicer scene.

Loading a Scene

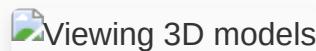


Viewing 3D models



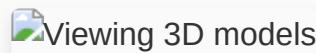
Viewing 3D models

Viewing 3D models



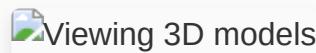
Viewing 3D models

Viewing 3D models



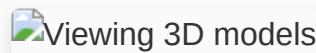
Viewing 3D models

Viewing 3D models



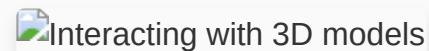
Viewing 3D models

Viewing 3D models

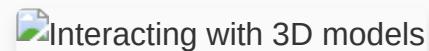


Viewing 3D models

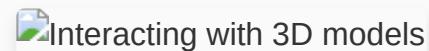
Interacting with 3D models



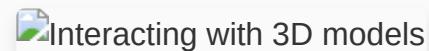
Interacting with 3D models



Interacting with 3D models



Interacting with 3D models



Conclusion

- 3D Slicer provides advanced functionalities for loading and viewing 3D medical imaging data
- The tutorial demonstrates how to use volume rendering and 3D surface modeling for interactive visualization of CT and MRI data

Contact: spujol@bwh.harvard.edu

Acknowledgements

Neuroimage Analysis Center (NIBIB P41
EB015902)