

Exercise 42 : Region of Interest Defining Regions and Volume Measurements

This exercise will demonstrate how to use more advanced region definition tools in the Region of Interest module to define objects of interest within a 3-D volume image. The exercise will also show you how to measure these objects.

1. Load the **MRI_3D_Head.avw** data set from the **\$:\BIR\images\TutorialData** directory. The data set may be available in the Analyze workspace if you have completed Exercise 41: ROI Defining Regions.



2. Open the **Region of Interest** module (**Measure > Region of Interest**).

3. Using the slice slider below the image display, move to **Slice 122**.



4. In the main ROI window, select the **Auto Trace** tool.

5. Position the cursor near the center of the brain and click to set a seed point. The ROI window will automatically update once a seed point is set to display a double-ended slider bar (to specify a threshold range) and other Auto Trace parameters (figure 1).

6. Use the double-ended slider bar to set the **threshold minimum** to **34** [A] and the **threshold maximum** to **129** [B]. Then, click **Apply** [C]. The double-ended slider bar will disappear and the new region will be named '1.Object'.



7. Press the **Copy Regions Forward** PowerBar button once. The auto trace will be copied to the next slice. Notice that the auto trace is recalculated for each slice based on the set threshold range.

8. Press **Copy Regions Forward** until the auto trace has been applied to all the remaining slices containing brain matter, (until approximately **slice 181**).

9. Once you have copied the region forward to the remaining slices, choose **Tools > Show Rendering** to open the Render Tool and view a 3-D rendering of the defined object (figure 2). Click **Done** to dismiss the window.

10. Open the **Objects** window (**View > Objects**). Select **Object.1** from the **Object** drop-down menu and change **Name** of Object.1 to **Brain**. Click **Done** to dismiss the window.

note You can change the image display size within the Size window (View > Size) or with the Magnifier PowerBar buttons.

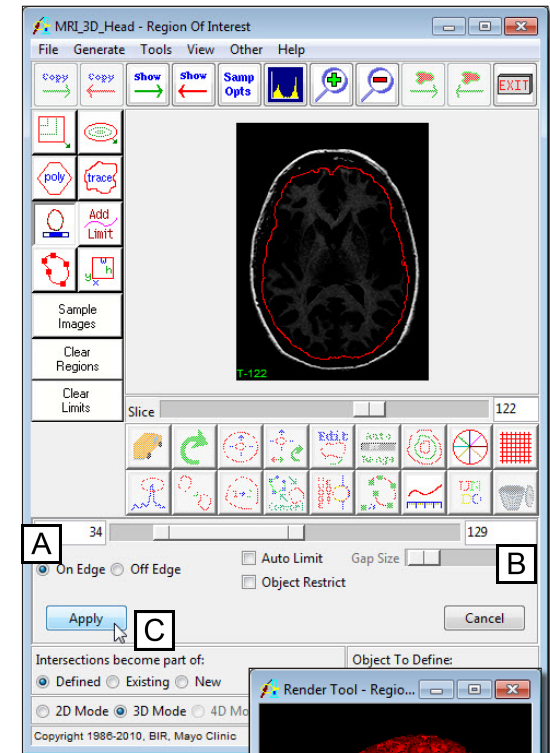


Figure 1

tip If you placed your seed point towards the outside of the brain, it will eventually be copied forward to an area of a slice that does not contain the brain. Select the 'Move' button and move the seed point to the middle of the brain, then, continue to copy the region forward. To learn more about editing regions see the Additional Task at the end of the exercise.

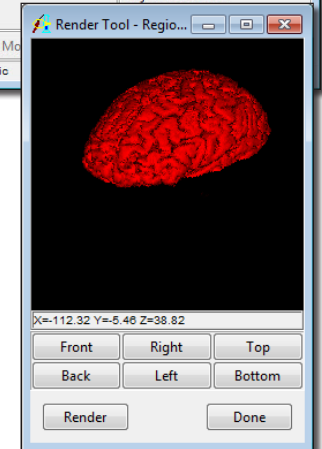


Figure 2

Exercise 42 : Region of Interest Defining Regions and Volume Measurements

Measuring Regions

Samp
Opts

11. Open the **Sample Options** window (**Generate > Sample Options**).
12. In the Sample Options window set the following (figure 3):
 - **Sample Type: Object(s)**, check the **Brain** object
 - **Summing: On**
 - **Sample: All Slices**
 - **Sequence Display: Off**
 - **Log Stats: On**
13. Click **Configure Log Stats** to open the ROI Stats window. The ROI Stats window displays all statistics that can be returned for the 'Stat Type' selected in the Sample Options window (in this case the 'Intensity' Stat Type). All statistics with a check mark in the 'Log' box to the left will be reported in the ROI Stat Log when the defined object is sampled.
14. Click **Sample Images**. The module will now sample the defined object ('Brain').
15. The ROI Stat Log will automatically be returned, displaying the object statistics (figure 4). Click **Done**; in the dialog box returned click **Discard**, then Exit.
16. In the Sample Options window switch **Summing** to **Off** and **Sequence Display** to **On**.
17. Click **Sample Images** to sample the object again. This time each slice will be displayed as it is sampled as 'Sequence Display' is now set to 'On'. Notice the difference in time taken to sample the entire volume. The object statistics for each slice will be reported in the ROI Stat Log, as 'Summary' is set to 'Off'.
18. In the Sample Options window, set **Sample** to **Slices Specified in Slice Menu**.
19. Open the **Slice** window (**Generate > Slice**) and set **Slice** to **122** (the first slice with the object) and **Number** to **59** (the number of slices after 122 on which the object appears) (figure 5).

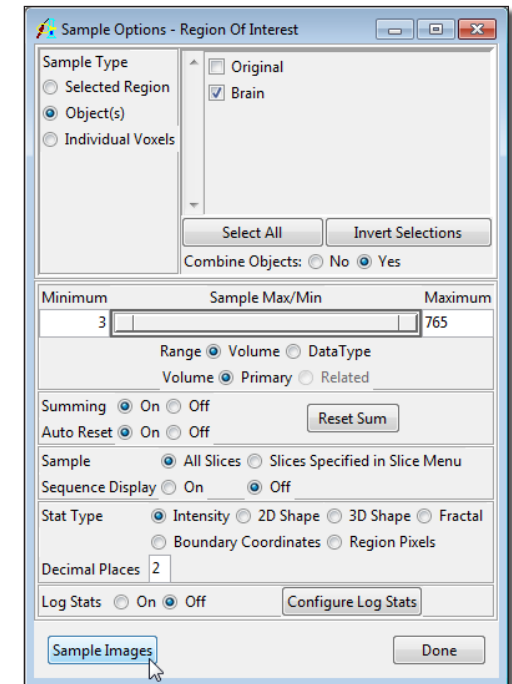


Figure 3

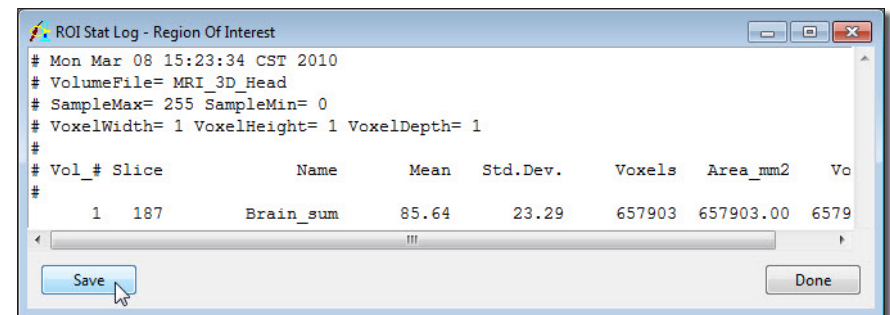


Figure 4

Exercise 42 : Region of Interest Defining Regions and Volume Measurements

20. Click **Sample Images**. Only the slices specified in the Slice window will be sampled.
21. Experiment sampling the data with the different Stat Types available in the Sample Options window, for a full explanation of statistic types choose **Help > User's Guide** in the main ROI window.
22. To learn about editing regions complete the following Additional Task.

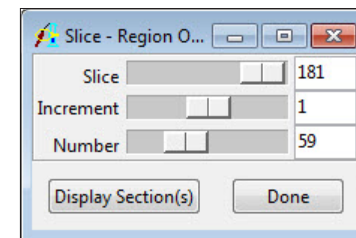


Figure 5

1. Editing Regions



1. Using the **Show Next** and **Show Previous Slice** PowerBar buttons, review the 'Brain' object (defined previously) slice-by-slice to determine if the auto trace leaked into other structures.
2. On slices where the auto trace leaked, select the **Edit Region** button and draw in the edge of the brain where the leak occurred. Areas beyond that edge will be removed from the object on that slice.
3. Next, use the slice slider below the image and move to **slice 62**.
4. Ensure that the **Object to Define** is set to **Brain** (at the bottom of the ROI window). Then, trace the brain on slices 62-121 using the Auto Trace or another region definition tool.
5. Once you have traced the 'Brain' object on slices 66-121, choose **Tools > Show Rendering** to open the Render Tool and view a 3-D rendering of the define object (figure 1). Click **Done** to dismiss the window.
6. Open the **Sample Options** window (**Generate > Sample Options**) and set **Summing** back to **On** and **Sample** to **All Slices**.
7. Click **Sample Images** in the main ROI window to sample the 'Brain' object as it is defined on slices 66-181.
8. Choose **File > Save Object Map** to save the object map with the 'Brain' object.
9. Close the Region of Interest module before proceeding to the next exercise.

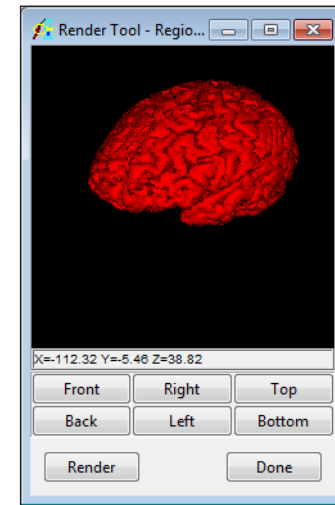


Figure 1