

# Volume Edit: Advanced Segmentation

Exercise 37

In this exercise we will review some of the additional tools and options in the Volume Edit module designed to enhance your segmentation capabilities. The exercise will demonstrate the application of the Edge Strength and Walls tools to set 3D limits on the image data set. The exercise will then explore the Object Extractor, Object Separator, and Oblique Cutting options.

1. Download the **Cardiac\_CT.awv** data set from [www.analyzedirect.com/data](http://www.analyzedirect.com/data). Unzip the file and then use **File > Load** to load the data set into Analyze.
2. Select the **Cardiac\_CT** data set and open **Segment > Volume Edit**.
3. In the **Edge Strength** tab check the **Use Edge Strength**.
4. Set **Edge Strength Threshold** to **94** (figure 1). Note: The Edge Strength option allows users to mask the loaded volume with a threshold range of sobel filter gradients, aiding with the segmentation of objects.
5. Next select the **Walls** tab. Check **Define walls to limit semi-automated operations**. Now select **Draw Wall** and then set **Wall Type** to **Line** (figure 2).
6. Using the slice slider below the transverse image, move to slice **138**. Draw a line along the mitral valve between the left ventricle and left atrium (figure 3).
7. Now move to transverse slice **171**. Draw another line along the mitral valve (figure 4). Note: Using the transverse slice slider move back to slice 138. Note that the wall defined between slice 138 and 171 has interpolated between the two positions over the slices in between. This wall will act as a 3D limit across the volume aiding with segmentation of the data. Move back to slice 171 before proceeding.
8. In the object control panel click the **Add Object** button

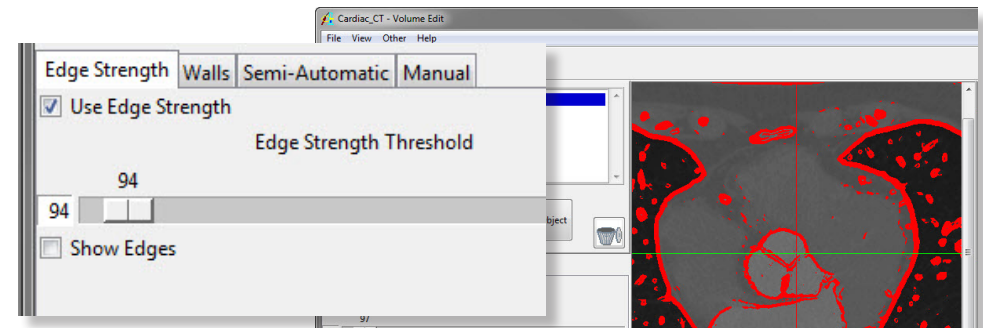


Figure 1

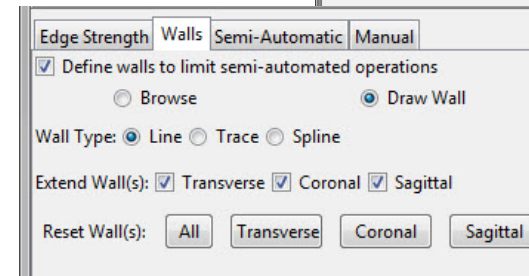


Figure 2

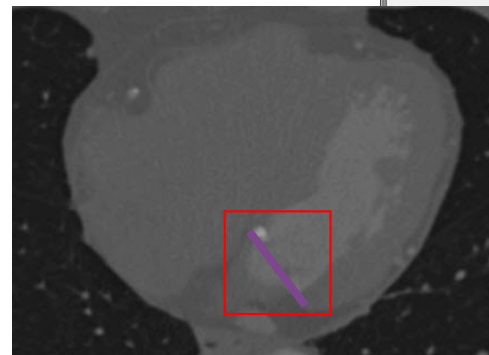


Figure 3

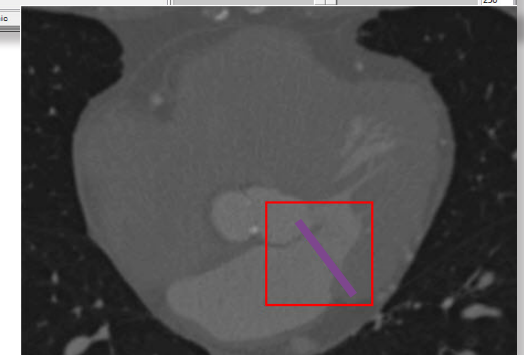


Figure 4

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(figure 5).

9. Select the **Semi-Automatic** tab and choose the **Object Extractor** option.
10. Using the Sagittal slice slider move to slice **228**.
11. Click in the middle of the left atrium to set a seed point (figure 6). Set the following threshold range: **Minimum: 235** and **Maximum: 2213**.
12. Click **Extract Object** (figure 7). Note: The 3D limits specified by defining walls in the transverse orientation prevented the aorta from being included as part of this segmented object.
13. Click the **Add Object** button and move to transverse slice **262**.
14. Click in the middle of the aorta to set a seed point (figure 8). Note: The module remembers the previous threshold range set (if the seed pixel value is within the threshold range) and will automatically populate the minimum and maximum threshold values.
15. Click **Extract Object** (figure 9).
16. To enable the transparency rendering view right-click on the rendering and select **Transparency**.
17. Click **Add Object**.

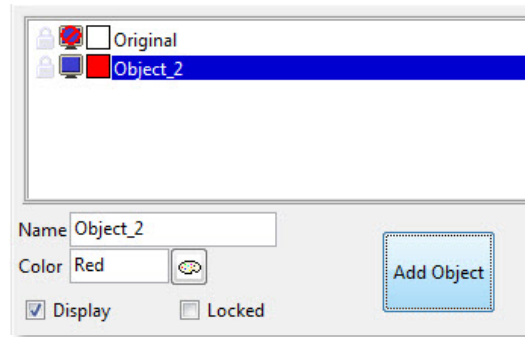


Figure 5

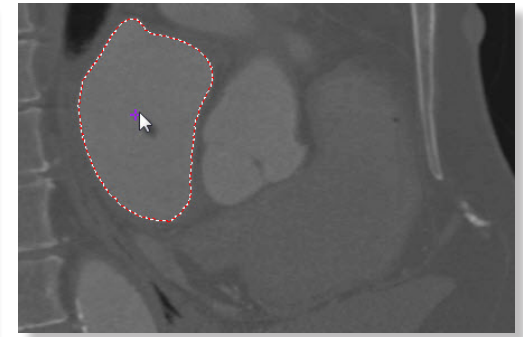


Figure 6

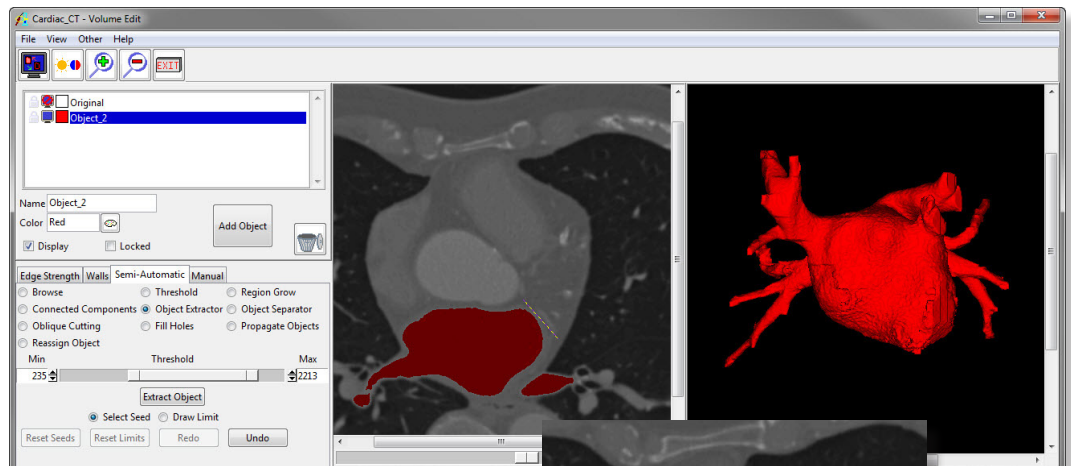


Figure 7

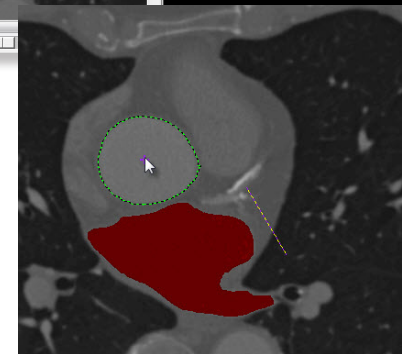


Figure 8

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18. Next select the **Object Separator** option.
19. On the rendering click to set a seed point on the aorta.
20. Then set a second seed point on the left ventricle below the aortic valve.
21. Now click **Separate**. The aorta will be split into two objects (figure 10).
22. Click **Add Object**.
23. Now select the **Browse** tool. Using the middle mouse button (or the left-mouse button + CTRL key) rotate the rendering of the heart so you can clearly see the pulmonary vein.
24. Select the **Oblique Cutting** option and then click on the pulmonary vein. The Volume Edit interface will update to show the **Oblique Cutting** interface. Note: The oblique plane can be moved or rotated interactively using the orthogonal images or the rendering.
25. Right-click in the oblique image and select the **Dimensions/Increment** option. Set the **Width** to **50** and the **Height** to **50**, then click **Done**.
26. Click the **Cut** button in the manual control panel to separate the pulmonary vein into the new object (figure 11).
27. Click **Browse** to return to the regular Volume Edit interface.
28. Select **File > Save Object Map** to save your work.
29. Close the Volume Edit module.

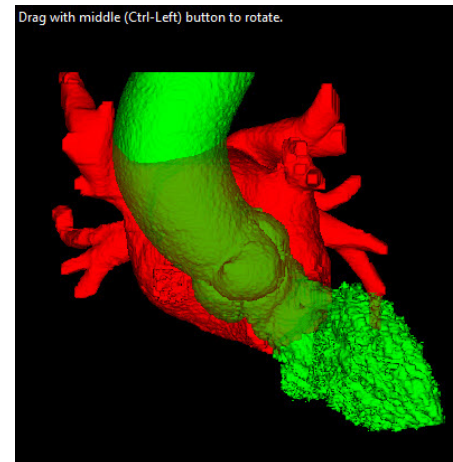


Figure 9

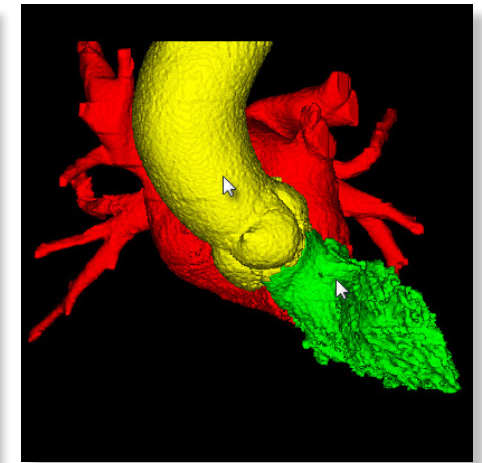


Figure 10

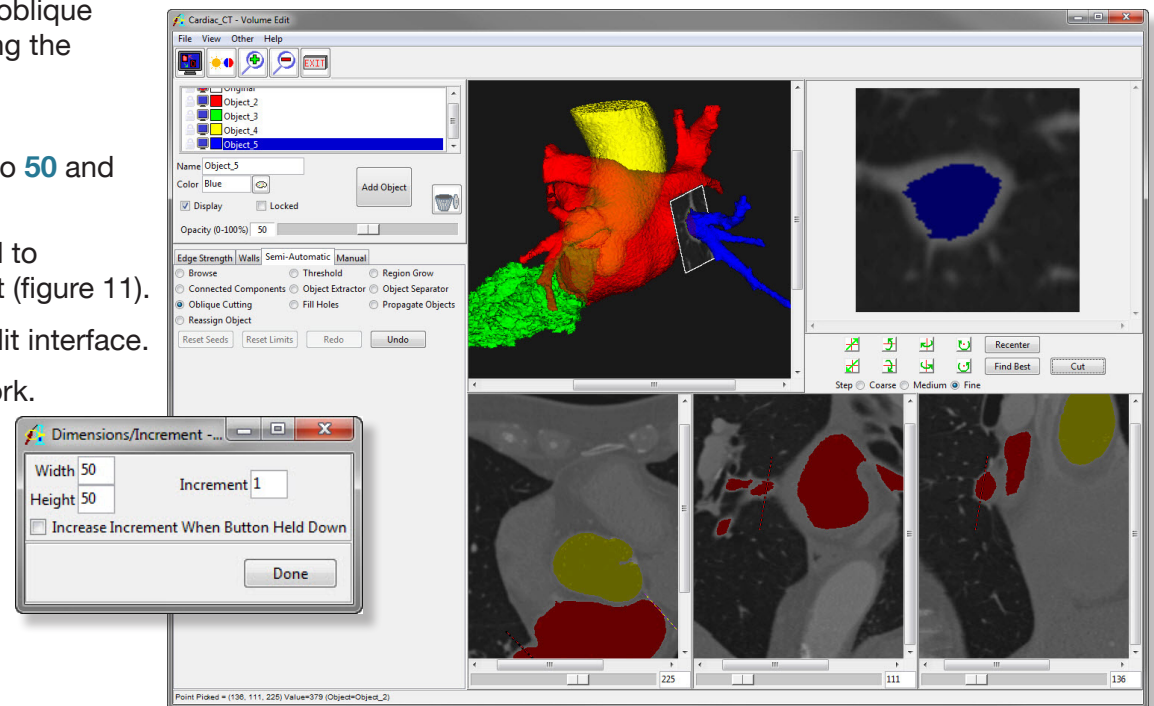


Figure 11