Edge Strength

The Edge Strength option allows users to mask the input data with a set of enhanced gradients that act as limits aiding in the segmentation of structures. Edge strength works by applying a 3 X 3 X 3 Sobel filter to the image data, which can be interactively adjusted using the Edge Strength Threshold slider. All voxels with gradient values less than or equal to the selected threshold value are displayed in red and form boundaries around structures. The boundaries act as limits, restricting semi-automatic segmentation operations.

1. Using Edge Strength In Segmentation

First we will attempt to segment the heart from this CT data set without using edge strength.

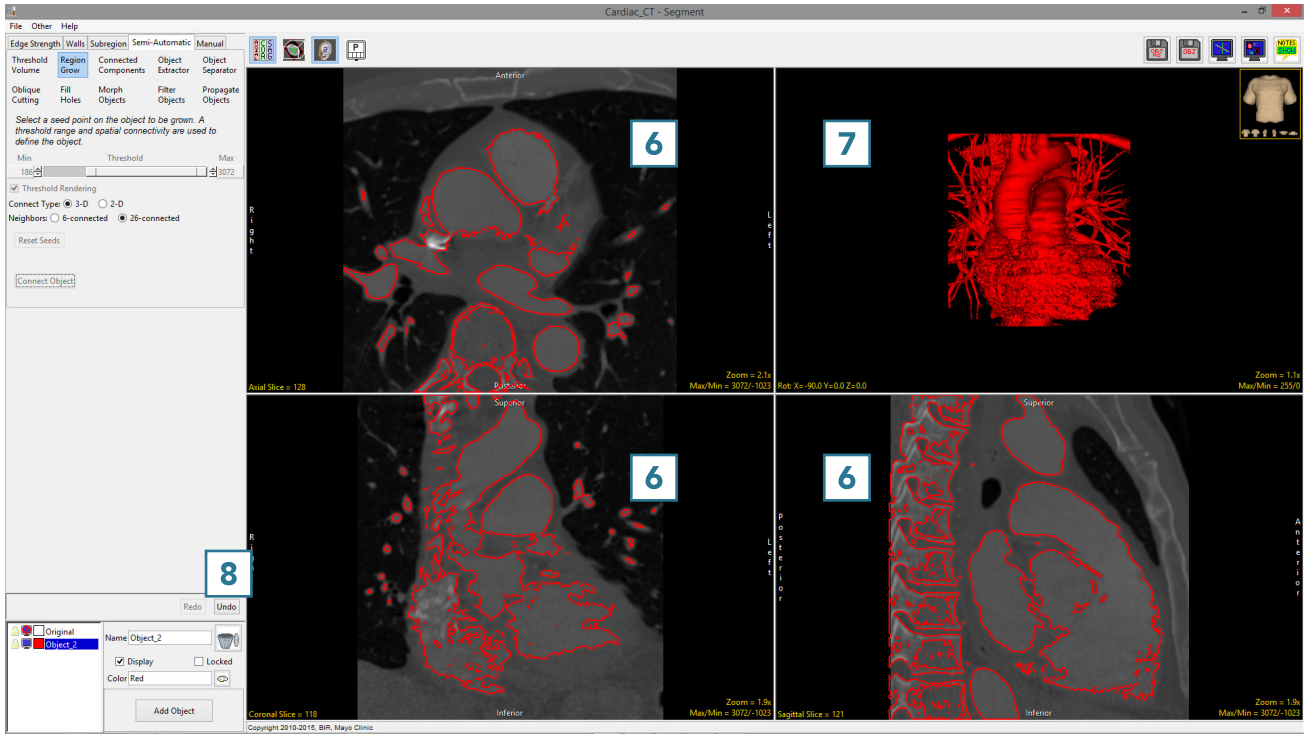
- Select a data set and open Segment.
- Select Semi-Automatic 1 and choose Region Grow. 2
- Click on the image data to set a seed point. 3 The seed point should be in the object you would like to isolate.
- Set the threshold Min/Max values to define the object 4 and click Connect Object. 5

Download the CT_Heart data set to follow along http://analyzedirect.com/data/

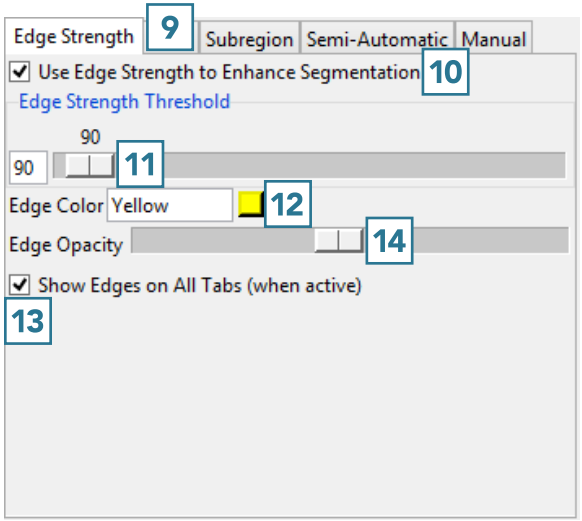
- The results of the region grow are shown below.
- The segmented object is shown overlaid on the 2D slice data 6 and a 3D representation 7 is displayed.

Note that both the heart and the spine have been assigned to Object_2.

- Click Undo.

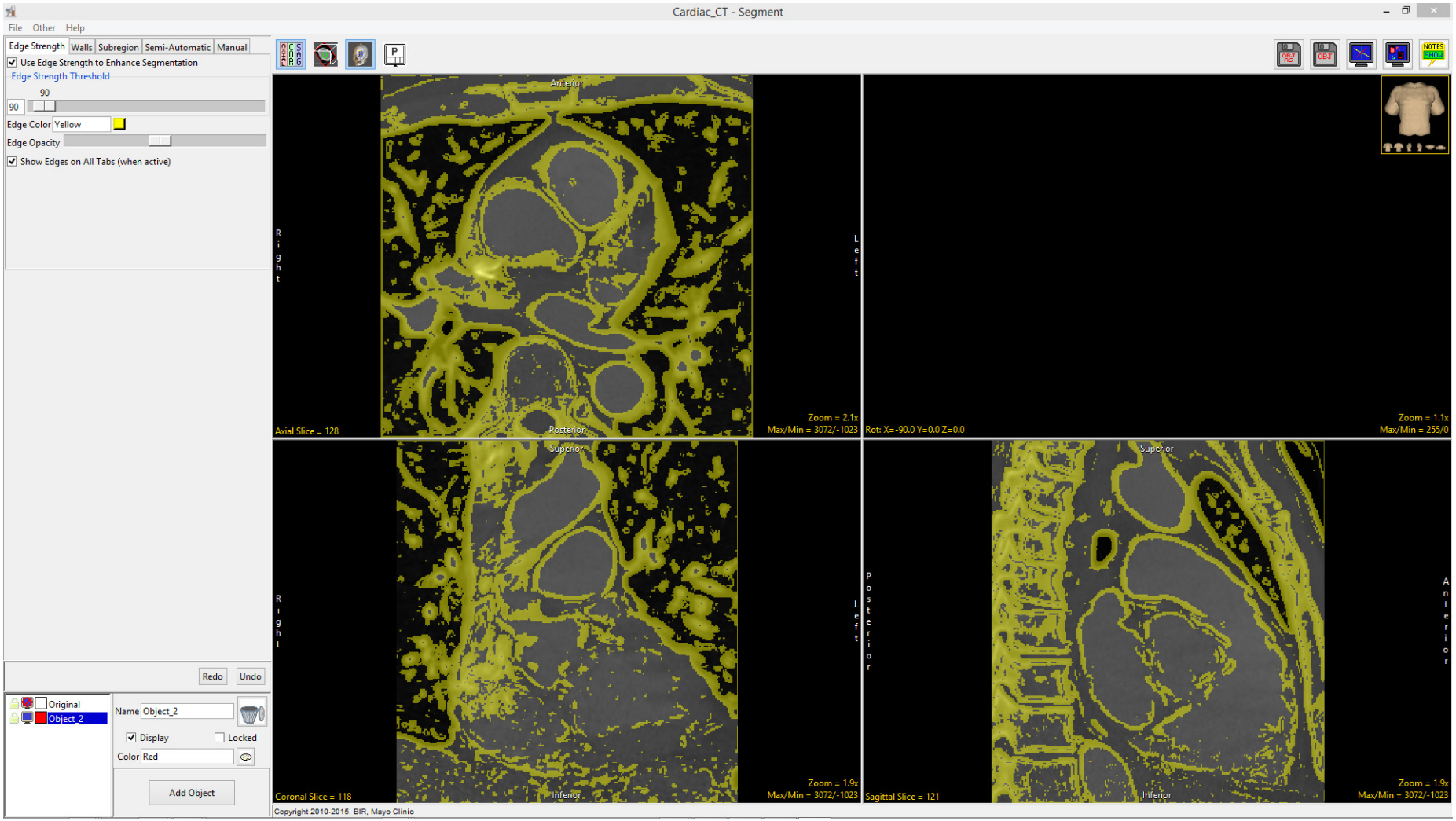


Now we will repeat this segmentation using edge strength to separate the heart from the rest of the data set.

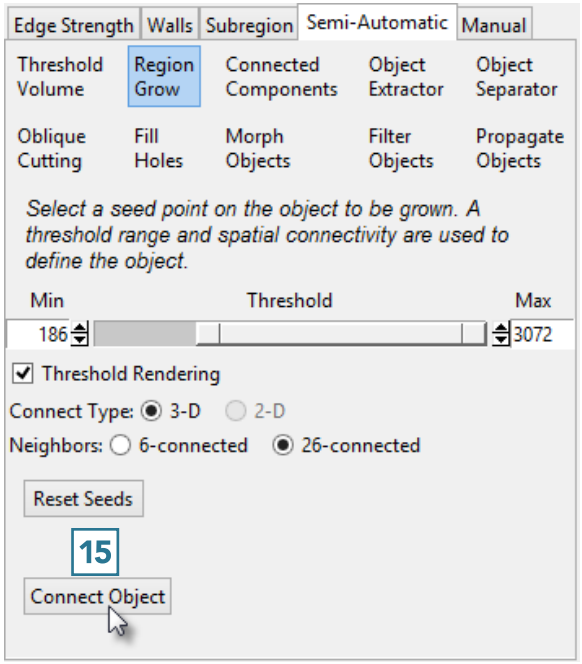


- Select Edge Strength 9 and check Use Edge Strength to Enhance Segmentation. 10
- Set the Edge Strength Threshold to 90. Note that this value will be different for each data set. In general, adjust the edge strength using the slider 11 until you find a suitable value. The edges will interactively update on the data set. Use the edge display to determine the suitable edge strength value.
- Optionally, change the color of the edge by entering the desired color in the text field or by using the color selector. 12
- When performing the segmentation, leave the Show Edges checkbox 13 selected. If required, reduce the Edge Opacity using the slider. 14

The edges detected on this data set using the Edge Strength algorithm with an edge strength threshold of 90 are shown overlaid on the data below.



- Repeat the segmentation. Select Semi-Automatic, then choose Region Grow.
- Click on the image data to set a seed point. The seed point should be in the object you would like to isolate.
- The Threshold Min/Max values should still be set to the previous values. If not, reset them to define the object and then click Connect Object. 15



Note that this time, only the heart was segmented. The Edge Strength technique prevented the region grow algorithm from including the spine in the object. Further segmentation can now be achieved with or without Edge Strength enabled. Select File > Save Object Map to save your work.