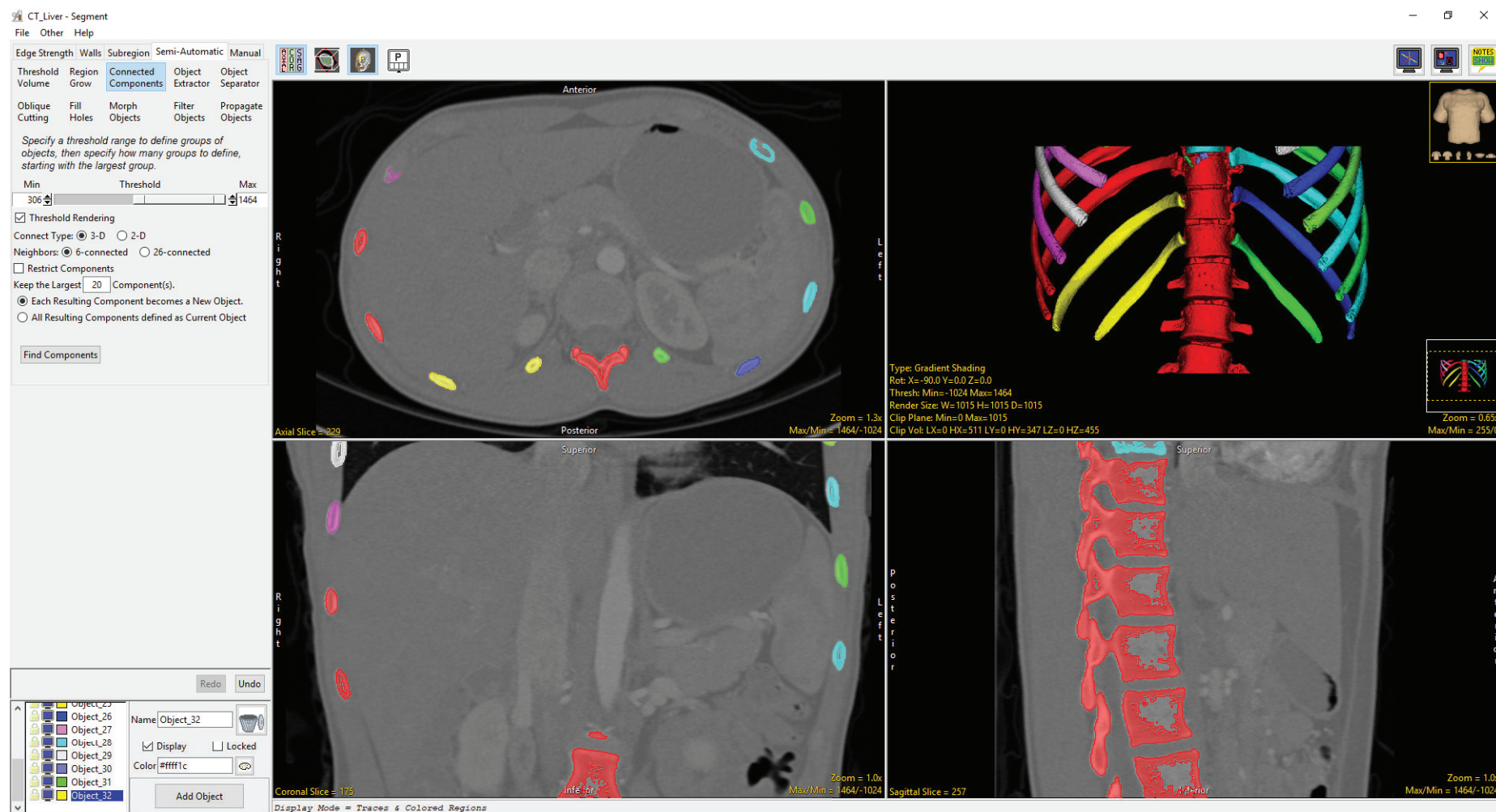




Connected Components

The connected components tool allows users to identify groups of objects based on spatial connectivity and intensity range. This segmentation method finds groups of voxels within a user-specified intensity range and assigns spatially disconnected groups to independent objects. The number of objects identified is specified by the user, and objects are created in order of largest to smallest based on the number of connected voxels in each object.





Connected Components Options

The following Connected Components options are available:

Threshold slider: The Threshold double-ended slider bar allows users to specify a range of threshold values using the minimum and maximum ends of the threshold slider. For a full description of the threshold slider please refer to the Threshold Volume section.

Min and Max: The minimum and maximum input field allows users to manually enter the minimum or maximum threshold value. There are also arrow up and down buttons the right of the input fields to increase or decrease the currently value by 1.

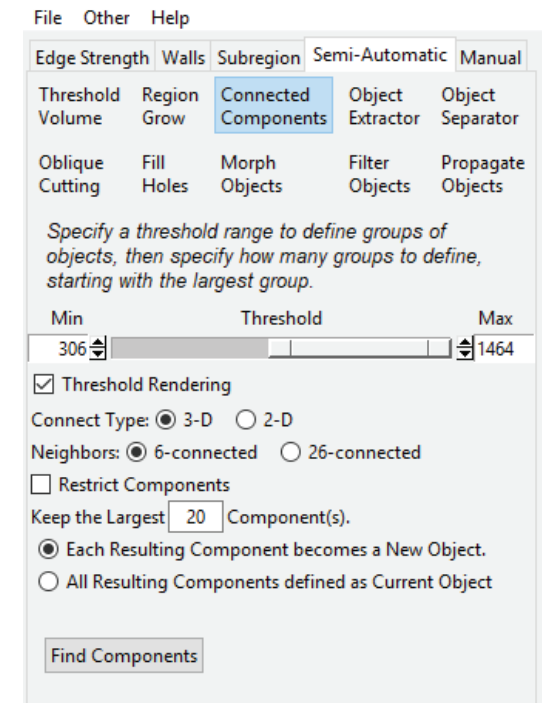
Threshold Rendering: Allows users to disable and enable to 3D preview of the selected voxel range. Disable this option by unchecking the checkbox when working with large data sets.

Connect Type: Determines if the connection type will be 3D or 2D.

3-D: Region grow will be applied to the (3D) volume.

2-D: Region grow will be limited to the current (2D) slice.

Neighbors: Allows users to select the number of neighboring voxels during the connection process. The options available depend on the connect type. For 3D, users can choose 6-connected or 26-connected. For 2D, 4-connected or 8-connected can be selected. For a full description of the neighbor options refer to the Region Grow section.





Connected Components Options (continued)

Restrict Components: When enabled displays a set of criteria that can be used to restrict the object segmentation resulting from the connected component analysis. Components with less than or more than the values entered in the x and y parameters will be ignored in the connected components analysis. These options specify that All Components must have:

- At least 'x' voxel(s), but no more than 'y' Voxels(s): Segmented components must have at least the minimum number of voxels in its structure as specified by 'x' and no more than the maximum number of voxels in its structure as specified by 'y'.
- A Width of 'x' voxel(s), but no more than 'y' Voxels(s): Segmented components must have a width of at least the minimum number of voxels as specified by 'x' and no more than the number of voxels as specified by 'y'.
- At Height of 'x' voxel(s), but no more than 'y' Voxels(s): Segmented components must have a height of at least the minimum number of voxels as specified by 'x' and no more than the number of voxels as specified by 'y'.
- At Depth of 'x' voxel(s), but no more than 'y' Voxels(s): Segmented components must have a depth of at least the minimum number of voxels as specified by 'x' and no more than the number of voxels as specified by 'y'.

Keep Largest X Component(s): Allows users to set the maximum number of objects to be kept in the connected component process.

Each Resulting Component becomes a New Object: When selected determines that each segmented component is assigned to its own object in the object map.

Each Resulting Component defined as Current Object: When selected determines that each segmented component is assigned to the current object selected in the object map.

Find Components: Initiates the connected components segmentation.

☒ **Restrict Components**

All Components must have:

At least Voxel(s), but no more than Voxel(s)

A Width of Voxel(s), but no more than Voxel(s)

A Height of Voxel(s), but no more than Voxel(s)

A Depth of Voxel(s), but no more than Voxel(s)

Keep the Largest Component(s).

☒ Each Resulting Component becomes a New Object.

☐ All Resulting Components defined as Current Object

Find Components



Segmenting Multiple Objects Using Connected Components

Here we will use Connected Components to segment several objects in a dataset.

To follow along, download the data set CT_Liver from analyzedirect.com/data and load into Analyze using Input/Output.

- Select the data set and open Segment.
- In the Object Control window click Add Object, name the object Bone and then make sure the object is selected [1].
- Select Semi-Automatic [2] and choose Connected Components [3].
- Set the threshold range [4] to isolate the spine and ribs. A minimum threshold value of 295 and a maximum of 1464 works well for this dataset.
- Set the number of components to keep to 14 [5].
- This time select the *Each Resulting Component defined as Current Object* option [6]. Now all 14 isolated components will be set to a single object.
- Click Find Components [7].
- The data will be thresholded and the largest groups of voxels specified will be identified and rendered as a single object [8].

