Fabricate Shape(s)

The Fabricate Shape(s) tool allows users to create 2D and 3D objects in the object map or input grayscale data. The tool provides options for users to create shapes interactively or by loading a list of coordinates defined in a text file.

The **Object to Create** option allow users to specify a set of parameters to create 2D or 3D objects within a data set.

Dimension: Allows users to choose to create a 2D or 3D object.

2-D: The following **Shape** options are available for 2D object creation:

Dot: The Dot option allows user to create a 1-pixel dot on any of the 2D images.

Square: The Square option allows users to create a 2D square on any of the 2D images.

Rectangle: The Rectangle option allows users to create a 2D rectangle on any of the 2D images.

Line: The Line option allows users to create a 2D line on any of the 2D images.

Circle: The Circle option allows users to create a 2D circle on any of the 2D images.

Oval: The Oval option allows users to create a 2D oval on any of the 2D images.

Note the Filled option allows users to enable (default) or disable the application of a fill to the preview of the 2D region, the fill color will correspond to the color of the selected object. Fill is not available for Dot or Line shape options.

Fabricate Shape(s) Options

Draw Slice: The Draw Slice options provide the ability to specify the orientation and slice the shape will be created on. Alternatively, the slice and orientation can be set by clicking on the desired slice in the desired orientation

- 2-D Orient: Choose from Axial, Coronal, or Sagittal.
- 2-D Slice: Use the slice slider or manually enter the slice number to create the object on for the selected orientation.

Location and Size: Provides the ability to specify the location and size of the shape being created. For any of the 2D shapes chosen (Dot, Square, Rectangle, Line, Circle, or Oval), the following shape dependent sub-options are enabled:

Dot Location and Size Options:

- Alt: Set the preferred way to define the size and location of the dot object. Press Alt to choose; pixels (default), real world distances, or X,Y coordinates (X,Y).
- X: Set the X location for the dot. Use the slider to set the value or manually enter the in the text entry box.
- Y: Set the Y location for the dot. Use the slider to set the value or manually enter the in the text entry box.

Square Location and Size Options:

- Alt: Set the preferred way to define the size and location of the square object. Press Alt to choose; pixels (default), real world distances, manually setting the X, Y coordinates for the lower left corner, using sliders to set the X, Y coordinates for the lower left corner, or manually setting the X, Y coordinates of the center of the square.
- Center X: Set the X center location for the square. Use the slider to set the value or manually enter the in the text entry box.
- Center Y: Set the Y center location for the square. Use the slider to set the value or manually enter the in the text entry box.
- Size: Set the size in pixels for the square. Use the slider to set the value or manually enter the in the text entry box. Alternatively, click on the square on the image and drag it to the desired size.

Fabricate Shape(s) Options (continued)

Object to Create > 2D > Location and Size (continued):

Rectangle Location and Size Options:

- Alt: Set the preferred way to define the size and location of the rectangle object. Press Alt to choose; pixels (default), real world distances, manually setting the lower left (X1, Y1) and upper right (X2, Y2) coordinates, using sliders to set X1, Y1, X2, and Y2, double-ended slides to specify the both the X and Y low and high values, or manually entering the lower left rectangle X and Y coordinates and the rectangle Width and Height values.
- Center X: Set the X center location for the rectangle. Use the slider to set the value or manually enter the in the text entry box.
- Center Y: Set the Y center location for the rectangle. Use the slider to set the value or manually enter the in the text entry box.
- Width: Set the width in pixels for the rectangle. Use the slider to set the value or manually enter the in the text entry box. Alternatively, select either vertical side of the rectangle on the image and drag it to the desired size.
- Height: Set the height in pixels for the rectangle. Use the slider to set the value or manually enter the in the text entry box. Alternatively, select either horizontal side of the rectangle on the image and drag it to the desired size.

Line Location and Size Options:

- Alt: Set the preferred way to define the size and location of the line object. Press Alt to choose; setting start X, Y and end X, Y points using sliders (default), double-ended sliders with pixel values, double-ended sliders with real world distances, or entering coordinates manually.
- Start X: Set the X start location for the line. Use the slider to set the value or manually enter the in the text entry box.
- Start Y: Set the Y start location for the line. Use the slider to set the value or manually enter the in the text entry box.
- End X: Set the X end location for the rectangle. Use the slider to set the value or manually enter the in the text entry box.
- End Y: Set the Y end location for the rectangle. Use the slider to set the value or manually enter the in the text entry box.
- Note, users can also manually adjust the end points of the line and drag to the desired location.

Fabricate Shape(s) Options (continued)

Object to Create > 2D > Location and Size (continued):

Circle Location and Size Options:

- Alt: Set the preferred way to define the size and location of the circle object. Press Alt to choose; pixels (default), real world distances, or manually entering the center X, Y coordinates and circle radius.
- Center X: Set the X center location for the circle. Use the slider to set the value or manually enter the in the text entry box.
- Center Y: Set the Y center location for the circle. Use the slider to set the value or manually enter the in the text entry box.
- Radius: Set the radius of the pixels for the circle. Use the slider to set the value or manually enter the in the text entry box.

Oval Location and Size Options:

- Alt: Set the preferred way to define the size and location of the oval object. Press Alt to choose; pixels (default), real world distances, manually entering the center X1, Y1 and X2, Y2 coordinates, using sliders to set the X1, Y1 and X2, Y2 coordinates, double-ended sliders to set both X/Y high/low values, or manually entering the lower left X and Y coordinates and the oval Width and Height
- Center X: Set the X center location for the oval. Use the slider to set the value or manually enter the in the text entry box.
- Center Y: Set the Y center location for the oval. Use the slider to set the value or manually enter the in the text entry box.
- Width: Set the width in pixels for the oval. Use the slider to set the value or manually enter the in the text entry box.
- Height: Set the height in pixels for the oval. Use the slider to set the value or manually enter the in the text entry box.
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3-D: The following **Shape** options are available for 3D object creation:

Dot: The Dot option allows user to create a 1-pixel dot within the volume data.

Cube: The Cube option allows users to create a 3D cube within the volume data.

Box: The Box option allows users to create a 3D box within the volume data.

Line: The Line option allows users to create a 3D line within the volume data.

Sphere: The Sphere option allows users to create a sphere within the volume data.

Ellipsoid: The Ellipsoid option allows users to create an ellipsoid within the volume data.

Cylinder: The Cylinder option allows users to create a cylinder within the volume data.

Fabricate Shape(s) Options (continued)

Object to Create > 3D (continued):
Note the Filled option allows users to enable (default) or disable the application of a fill to the preview of the 3D region, the fill color will correspond to the color of the selected object. Fill is not available for the Dot or Line shape options.

Location and Size: Provides the ability to specify the location and size of the shape being created. For any of the 3D shapes chosen (Dot, Cube, Box, Line, Sphere, or Ellipsoid), the following shape dependent sub-options are enabled:

Dot Location and Size Options:

- Alt: Set the preferred way to define the size and location of the dot object. Press Alt to choose; pixels (default), real world distances, text file input (see Creating Objects from a Text File for further information), or manually entering the X,Y, Z coordinates (X, Y, Z).
- X: Set the X location for the dot. Use the slider to set the value or manually enter the in the text entry box.
- Y: Set the Y location for the dot. Use the slider to set the value or manually enter the in the text entry box.
- Z: Set the Z location for the dot. Use the slider to set the value or manually enter the in the text entry box.
- Note, users can click on any of the 2D images or the rendering to set the X, Y, Z coordinates for the dot.

Cube Location and Size Options:

- Alt: Set the preferred way to define the size and location of the cube object. Press Alt to choose; manually entering X, Y, Z center voxel coordinates and cube size (default), sliders to define the X, Y, Z, and size parameters of the cube, sliders with corresponding real world distances, text file input, or manually setting the X, Y, Z coordinates for the lower left front corner coordinate and cube size value.
- Center (X, Y, Z): Set the cube center voxel by entering the X, Y, Z coordinates of the center location for the cube. Alternatively, click and drag the 2D display of the cube in any orthogonal orientations to reposition.
- Size: Set the size in voxels for the square. Users can also click on the 2D display of the cube in any orientation and interactively increase or decrease the size of the cube in 3D.

Fabricate Shape(s) Options (continued)

Object to Create > 3D > Location and Size (continued):

Box Location and Size Options:

- Alt: Set the preferred way to define the size and location of the box object. Press Alt to choose; to use slides to enter X, Y, Z and Width, Height and Depth values in voxels for the box (default), manually entering X, Y, Z center and the box Width, Height and Depth values, using sliders to specify the X, Y, Z center values and Width, Height, and Depth values in real world coordinates, use a text file to specify the box parameters, manually specify the X1, Y1, Z1 and X2, Y2, and Z2 values to define the box, use sliders to determine the X1, Y1, Z1 and X2, Y2, and Z2 values, use double-ended sliders the X, Y, and Z upper and lower parameters, or manually enter coordinates for LX, LY, LZ and With, Height, and Depth values to define the box.
- Left (X): Set the X value for the box. Use the slider to set the value or manually enter the in the text entry box.
- Lower (Y): Set the Y value for the box. Use the slider to set the value or manually enter the in the text entry box.
- Front (Z): Set the Z value for the box. Use the slider to set the value or manually enter the in the text entry box.
- Width: Set the width value for the box. Use the slider to set the value or manually enter the in the text entry box.
- Height: Set the height value for the box. Use the slider to set the value or manually enter the in the text entry box.
- Depth: Set the depth value for the box. Use the slider to set the value or manually enter the in the text entry box.

Line Location and Size Options:

- Alt: Set the preferred way to define the size and location of the line object. Press Alt to choose; setting start X, Y, Z points for the line end points using double-ended slider bars, using double-ended slider bars mapped to real work distances, manually entering the XYZ coordinates for both end points, or using single sliders to specify the Start X, Start Y, Start Z, End X, End Y, and End Z coordinates.
- X, Y, Z Sliders: Use the double-ended slider bar to set the X, Y and Z values for each end point of the 3D line. Adjusting the lower end of the slider will adjust the X, Y or Z point location for the first end point of the line while adjusting the upper end of the slider will adjust the X, Y or Z point location for the second end point of the line.
- Note, line end point for the 3D line can be adjusted by selecting and moving the end points on any of the orthogonal images.

Fabricate Shape(s) Options (continued)

Object to Create > 3D > Location and Size (continued):

Sphere Location and Size Options:

- Alt: Set the preferred way to define the size and location of the sphere object. Press Alt to choose; to set sphere parameters in voxels using an X, Y, Z and Radius slider (default), to set sphere parameters in real world distances using an X, Y, Z and Radius slider (default), a text file to define a sphere(s), or manually enter the X, Y, Z and Radius parameters in voxels manually.
- Center X: Set the X center location for the sphere. Use the slider to set the value or manually enter the in the text entry box.
- Center Y: Set the Y center location for the sphere. Use the slider to set the value or manually enter the in the text entry box.
- Radius: Set the radius of the pixels for the sphere. Use the slider to set the value or manually enter the in the text entry box.

Ellipsoid Location and Size Options:

- Alt: Set the preferred way to define the size and location of the ellipsoid object. Press Alt to choose; to set ellipsoid parameters in voxels (default), real world distances, using a text file, manually entering the center X1, Y1, Z1 and X2, Y2, Z2 coordinates, using sliders to set the X1, Y1, Z1 and X2, Y2, Z2 coordinates, double-ended sliders to set both X, Y, and Z upper and lower values, or manually entering the lower left X, Y, Z coordinates and the ellipsoid Width, Height, and Depth values, use sliders to enter the X, Y, Z position information and Width, Height, and Depth values, or coordinates to specify the center X, Y, Z and values for ellipse Width, Height, and Depth.
- Center X: Set the X center location for the ellipsoid. Use the slider to set the value or manually enter the in the text entry box.
- Center Y: Set the Y center location for the ellipsoid. Use the slider to set the value or manually enter the in the text entry box.
- Center Z: Set the Z center location for the ellipsoid. Use the slider to set the value or manually enter the in the text entry box.
- Width: Set the width in pixels for the ellipsoid. Use the slider to set the value or manually enter the in the text entry box.
- Height: Set the height in pixels for the ellipsoid. Use the slider to set the value or manually enter the in the text entry box.
- Depth: Set the depth in pixels for the ellipsoid. Use the slider to set the value or manually enter the in the text entry box.

Fabricate Shape(s) Options (continued)

Object to Create > 3D > Location and Size (continued):
Cylinder Location and Size Options:

- Alt: Set the preferred way to define the size and location of the cylinder object. Press Alt to choose; to set cylinder parameters in voxels (default), use real world distances, to use a text file, to manually entering the center X, Y, Z coordinates and input the radius and length values, or use sliders to input the Center X, Y, Z, Radius, and Length values.
- Center X: Set the X center location for the cylinder. Use the slider to set the value or manually enter the in the text entry box.
- Center Y: Set the Y center location for the cylinder. Use the slider to set the value or manually enter the in the text entry box.
- Center Z: Set the Z center location for the cylinder. Use the slider to set the value or manually enter the in the text entry box.
- Radius: Set the radius in pixels for the cylinder. Use the slider to set the value or manually enter the in the text entry box.
- Length: Set the length in pixels for the cylinder. Use the slider to set the value or manually enter the in the text entry box.
- Axis: Choose which axis; X, Y, or Z (default) to orientate the length of the cylinder.

Apply changes to: Allows users to select the image volume, the object map, or both to defined the fabricated shape(s).

Volume: Applies the fabricated object to the grayscale image data.

- **Set Volume Voxels to:** Choose to assign greyscale voxel values as user defined Specified value, a Random Value, or a Gaussian Value.
  - Specified value: Allows users to select a greyscale value that all voxels within the fabricated shape will be assigned to.
  - Random Value: Assigns voxel values within the fabricated shape to editable random values from 1 to 255.
  - Gaussian Value: Assigns voxel values within the fabricated shape to a Gaussian Value. Default Mu and Sigma values are assigned at 128.0 and 25.6 respectively but can be updated by the user.
- **Object Map:** Allows users to assign the fabricated shape to the selected object in the object list.
- **Both:** Applies fabricated shape to both the Volume and Object Map (see above).

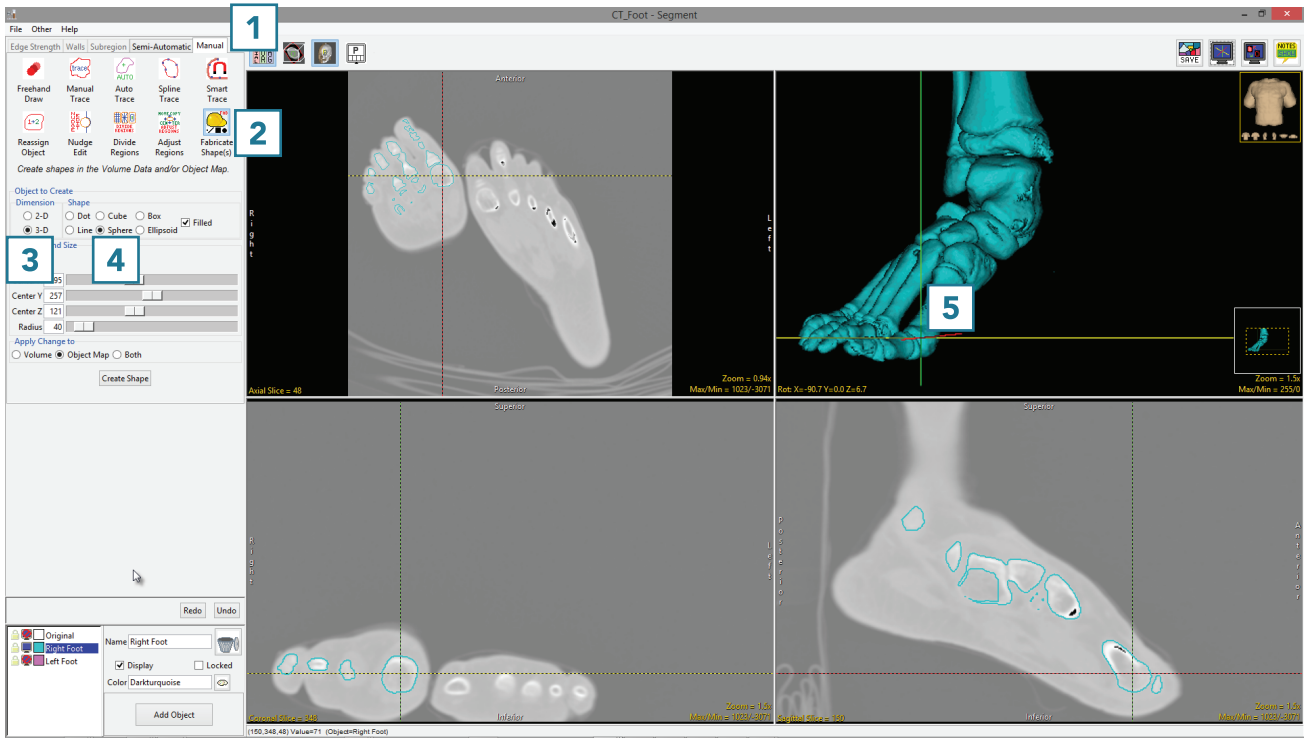
Create Shape: Initiates the Fabrication process.

Using Fabricate Shape(s)

Here we will use the Fabricate Shape(s) tool to create a 3D shape in a volume.

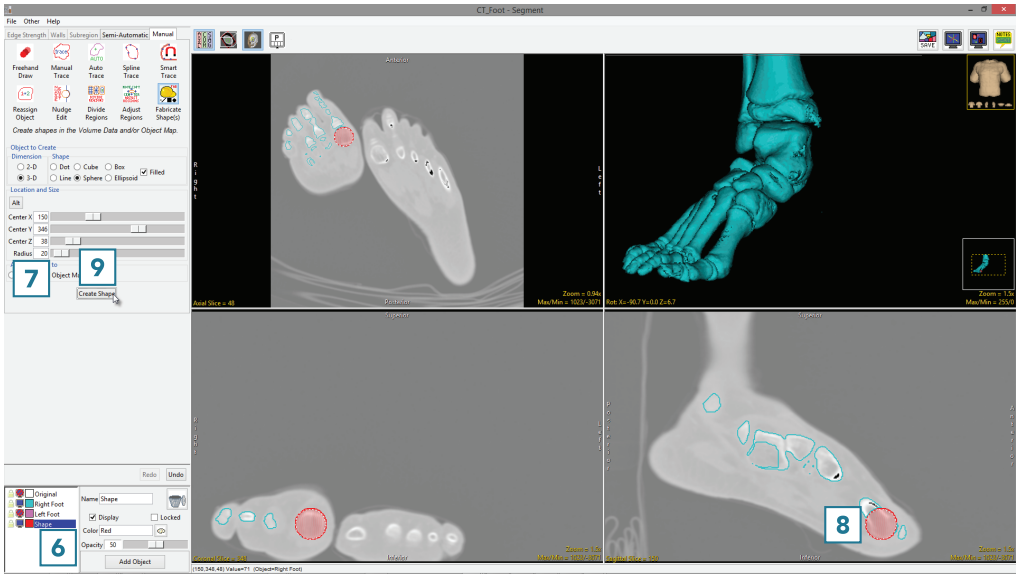
To follow along, download the data set CT_Foot from analyzedirect.com/data and load into Analyze using Input/Output.

- Select the data set and open Segment.
- Select File > Load Object Maps and load CT_Foot.obj.
- Select Manual [1] and choose Fabricate Shape(s) [2].
- Set the Dimension to 3D [3] and set the Shape to Sphere [4].
- Use the linked cursor to navigate to the location where you would like to create the new shape [5].

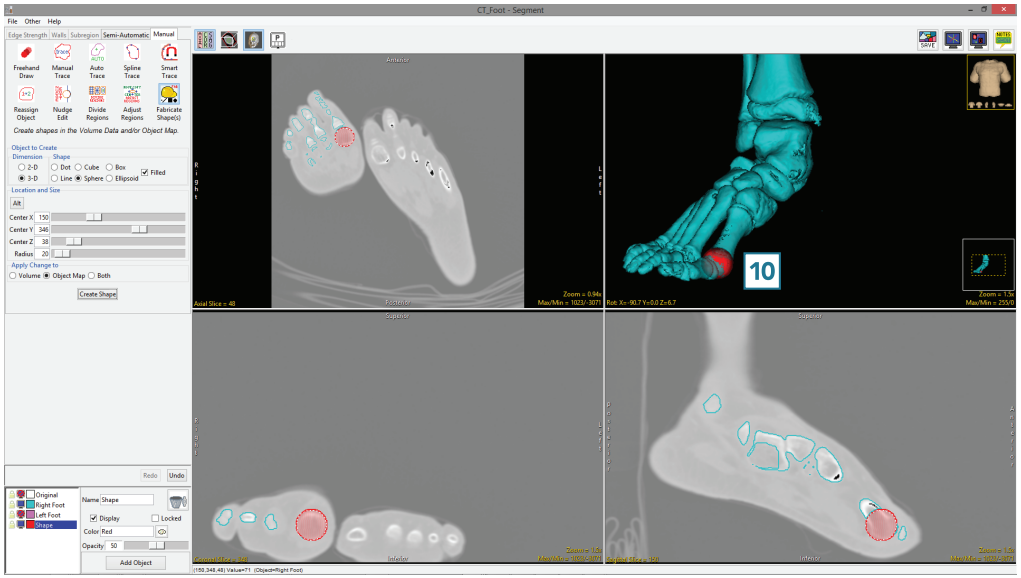


Using Fabricate Shape(s) (continued)

- Add a new object, name it and assign a color [6].
- Change the Radius of the sphere [7] and drag the 2D shape template in any of the images to the location you where you want to create the shape [8].
- Select Create Shape [9].



- The shape will be created and added to the object map. Right-click on the rendering and select Transparency for a clearer view of the object in 3D [10].



Creating Objects from a Text File using Fabricate Shape(s)

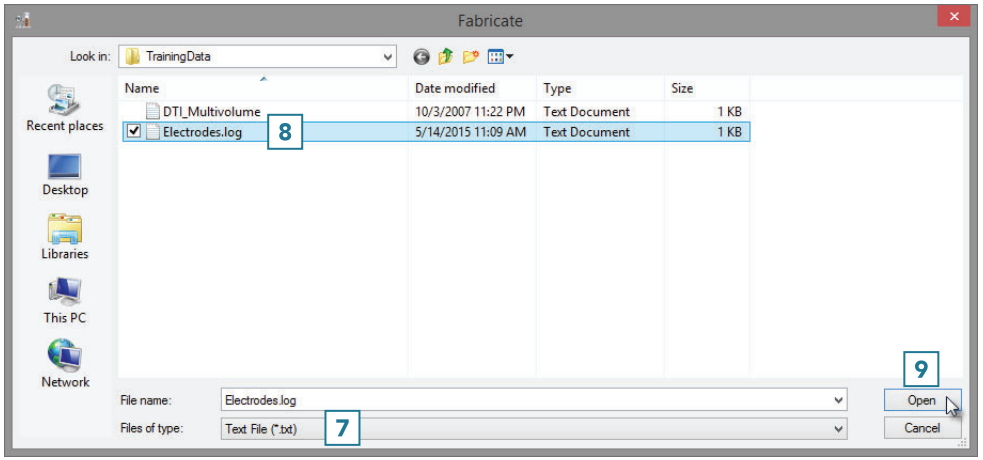
Here we will show how Fabricate Shape(s) can create objects defined in a text file.

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

- Select the data set and open Segment.
- Select File > Load Object Maps and load Trans_Pre_OP_MRI_brain.obj.
- Select Manual [1] and choose Fabricate Shape(s) [2].
- Set the Dimension to 3D [3] and set the Shape to Sphere [4].
- Add a new object, name it Electrodes and assign a color to the object [5].
- Click on the Alt button [6] and select File.

Creating Objects from a Text File using Fabricate Shape(s) (continued)

- In the window returned set Files of type to Text File (*.txt) [7].
- Select Electrodes text file [8] and click Open [9].



- Set the Radius to 6 [10] and click Create Shape [11].
- Once created, the new shapes will be added to the object map and can be viewed overlaid on the 2D images and in the 3D rendering [12].
- Right-click on the rendering and select Transparency for a clearer view of the objects in 3D.
- Select File > Save Object Map and save your object map as Trans_Pre_OP_MRI_brain_and_electrodes.obj.