# Object Extractor

The Object Extractor tool enables the user to define and extract objects from image data using a combination of thresholding, region growing and morphological operations.

First, a seed point is manually set on a structure of interest. Next, a threshold range is established by the user to define the structure. The region defined by a given threshold range is shown on the 2D slice containing the seed point using a 2D auto trace mechanism. This region updates interactively as the threshold range is adjusted, allowing the user to determine the threshold range that properly defines the region of interest. The Object Extractor segmentation routine is ready to be started once the seed point and threshold range define the structure on the initial slice.

The algorithm first applies a global threshold to the data set, using the minimum and maximum values specified by the user. Next a 3D binary erosion is performed on the binary result of the global threshold. The erosion attempts to break connections between the target structure and neighboring regions which have similar intensity values. The erosion is followed by a 3D 6-neighbor region grow, which uses the initial seed point. The processed target slice on which the initial seed point was set is compared to the initial auto trace from the user-defined seed point and threshold range. The erosion and region growing steps are repeated until the set of voxels on the processed target slice are a subset of the initial auto trace. Next, the processed data is conditionally dilated until 99% of the voxels in the auto traced region on the processed target slice are recovered. Once the extraction process is complete, the resulting object is rendered and displayed over the 2D slice data.

9. Segmentation of a Single Object Using Object Extractor

- Select a data set and open Segment.
- Select Semi-Automatic [1] and choose Object Extractor. [2]
- Click on the image data to set a seed point in the object you would like to isolate. [3]
- Adjust the minimum threshold value [4] until the auto trace defines the object. [5]

Download the EGV_MRI data set to follow along
http://analyzedirect.com/data/
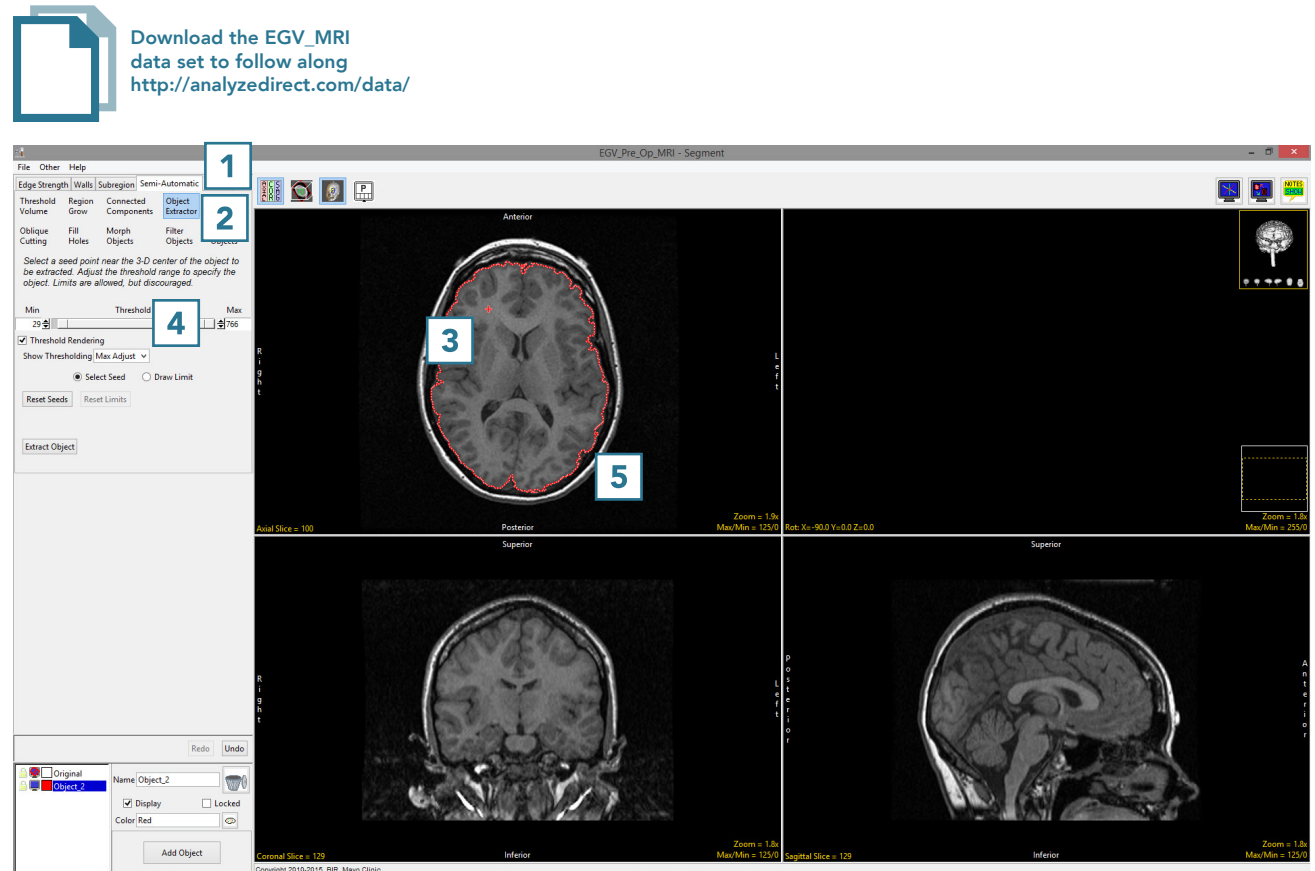
- Adjust the maximum threshold level and note that the red binary mask will interactively update.
- Lower the maximum threshold value until holes start to appear in the red binary mask in the structures surrounding the brain, but not in the brain. **6**

- Click Extract Object. **7**
- Once segmentation is complete, the object map will be rendered **8** and overlaid on the slice data. **9**
- Save your work by selecting File > Save Object Map.