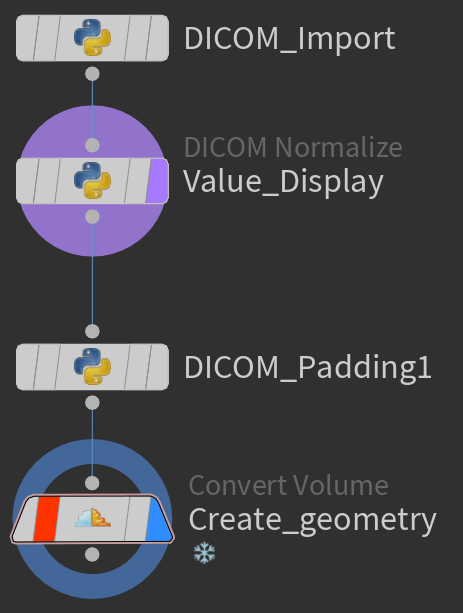
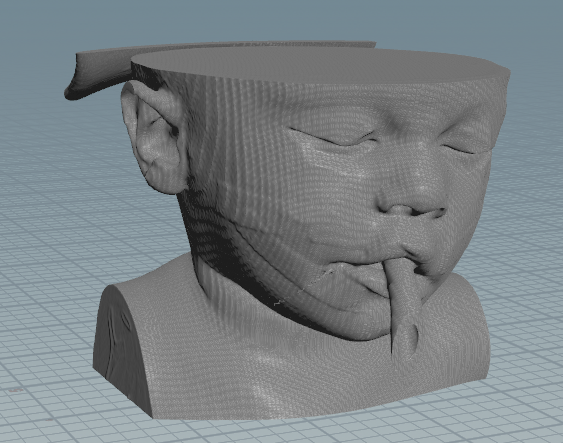
Houdini Airway and Segmentation and Center Finding

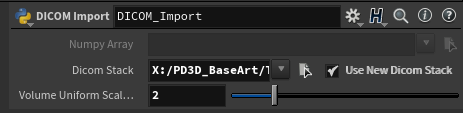
# DICOM Source Import



The first step to finding an airway path, is to create the geometry that you want to pull the airway from. Frequently this data is pulled from DICOM scans of a patient which traditionally has been segmented in programs like Mimics or 3D Slicer; however, using our [Houdini DICOM toolset](https://github.com/pd3d/Houdini-DICOM-Toolset) it can be done in Houdini, to minimize the amount of software required for this process.

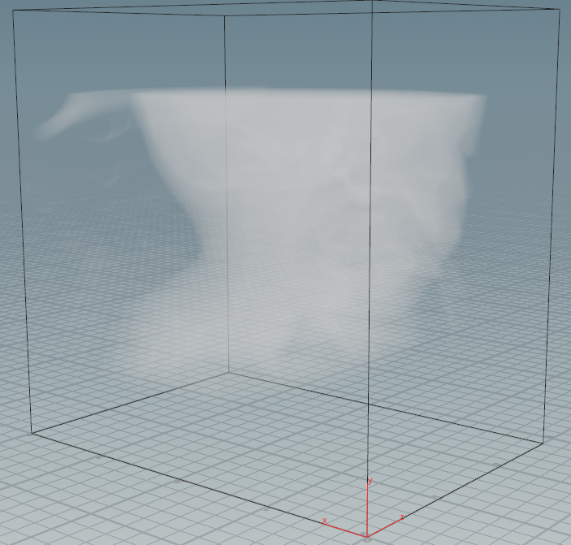
The image to the right shows the graph required to import a stack of .dcm files, and export them as geometry for segmentation in Houdini, which will produce the results shown below.

## Import Node



The first node involved in creating geometry from source data is a DICOM import node. The setting options are shown above, this will create a new volume containing the raw HU values of the DICOM scan, at 2 times scale, which produces the results seen on the right, which are very blown out due to Houdini being designed to only represent voxels with values between 0 and 1.

## Visualization Node



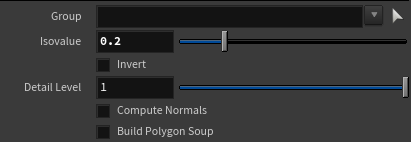
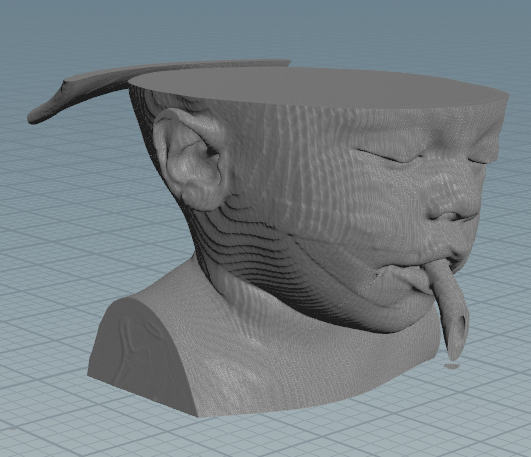
The visualization node has no parameters, but normalizes the HU values of the DICOM scan to allow for better editing in the Houdini environment.

The min and max value of the source data is preserve, so there is no loss of fidelity if attempting to transition between the normalized values and the source values.

## Padding Node

Traditionally, DICOM information is stored all the way to the outer edge of the DICOM file. However, for Houdini to create a closed shape when converted into polygons, it requires a small space to signify the closing of geometry. In order to achieve this effect a padding node is placed down which simply surrounds the data in a shell to signify its termination.

## Convert Volume



After Setting up the parameters the DICOM information can be converted into geometry. This will be used to create our Signed Distance Field VDB later. The Isovalue parameter is the only one that needs to be modified, it will allow you to determine the hardness tolerance that is used to define the outside edge of the mesh.

# Setting up VDB volume

The next step in this process is to clean up scan errata, and remove extra pieces that are not related to the biology of the patient. In the last section, you can see a headrest that was used to hold the patient still while the scan took place,

## Linking import results