3D Mutual Information

The Mutual Information Register Type is an implementation of the Normalized Mutual Information algorithm and allows users to spatially register two volume images. Several unique and powerful algorithms allow the precise alignment of 3D data to be achieved, both quickly and efficiently. This exercise will demonstrate how to register two images of different modalities.
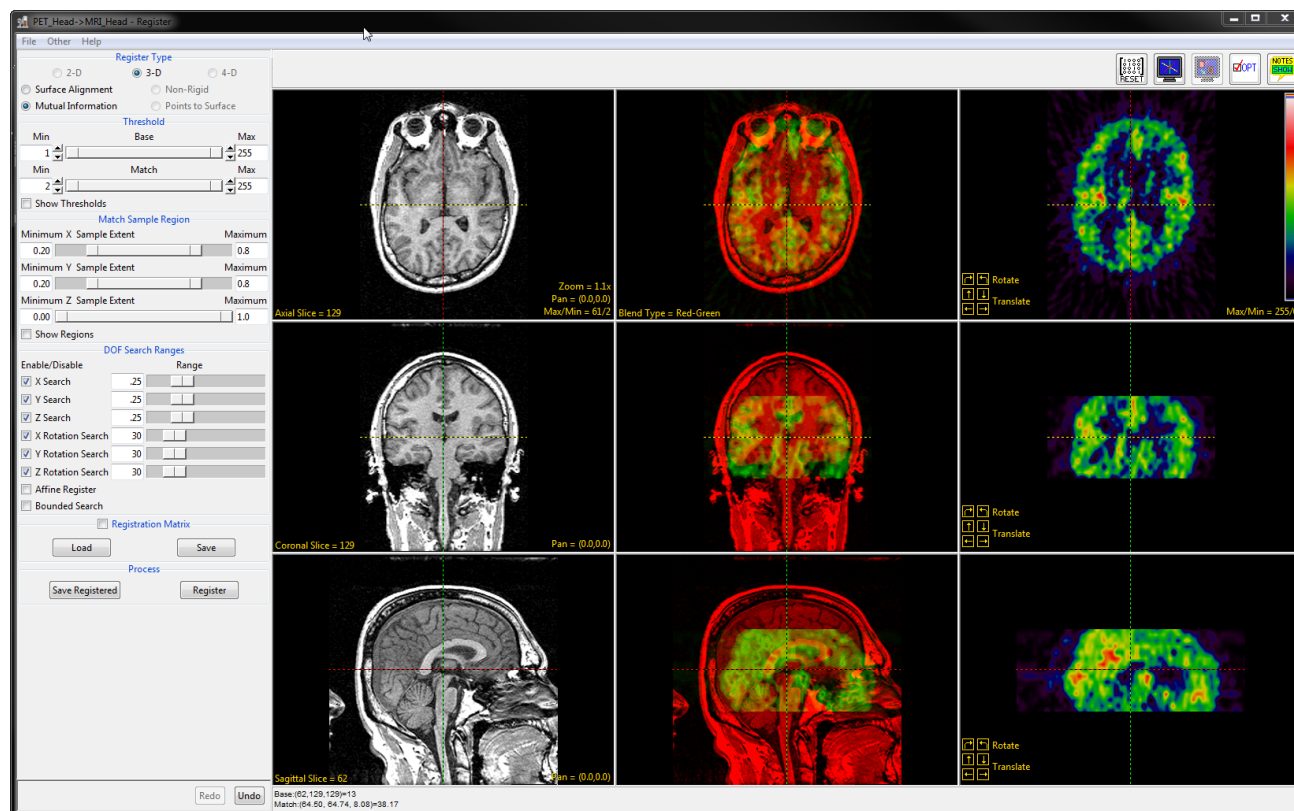
Automatic Registration

- Select the first data set (MRI_Head. avw), and while holding down the <Ctrl> key, select the second data set (PET_ Head.avw).

- Open Register.

- Select File > Input/Output Ports to view the input and output ports at the bottom of the Register window. Make sure that MRI_Head is the base volume, and PET_Head is the match volume.

- The crosshair in each of the image display panes can be used to move through the volumes. When the crosshair is moved in any of the panes, the other panes automatically update to display the same volume coordinate.

Note that the base and match coordinates are reported at the bottom of the window.

- Right-click on any of the image display panes in the last column to view several options such as adding an alignment grid.
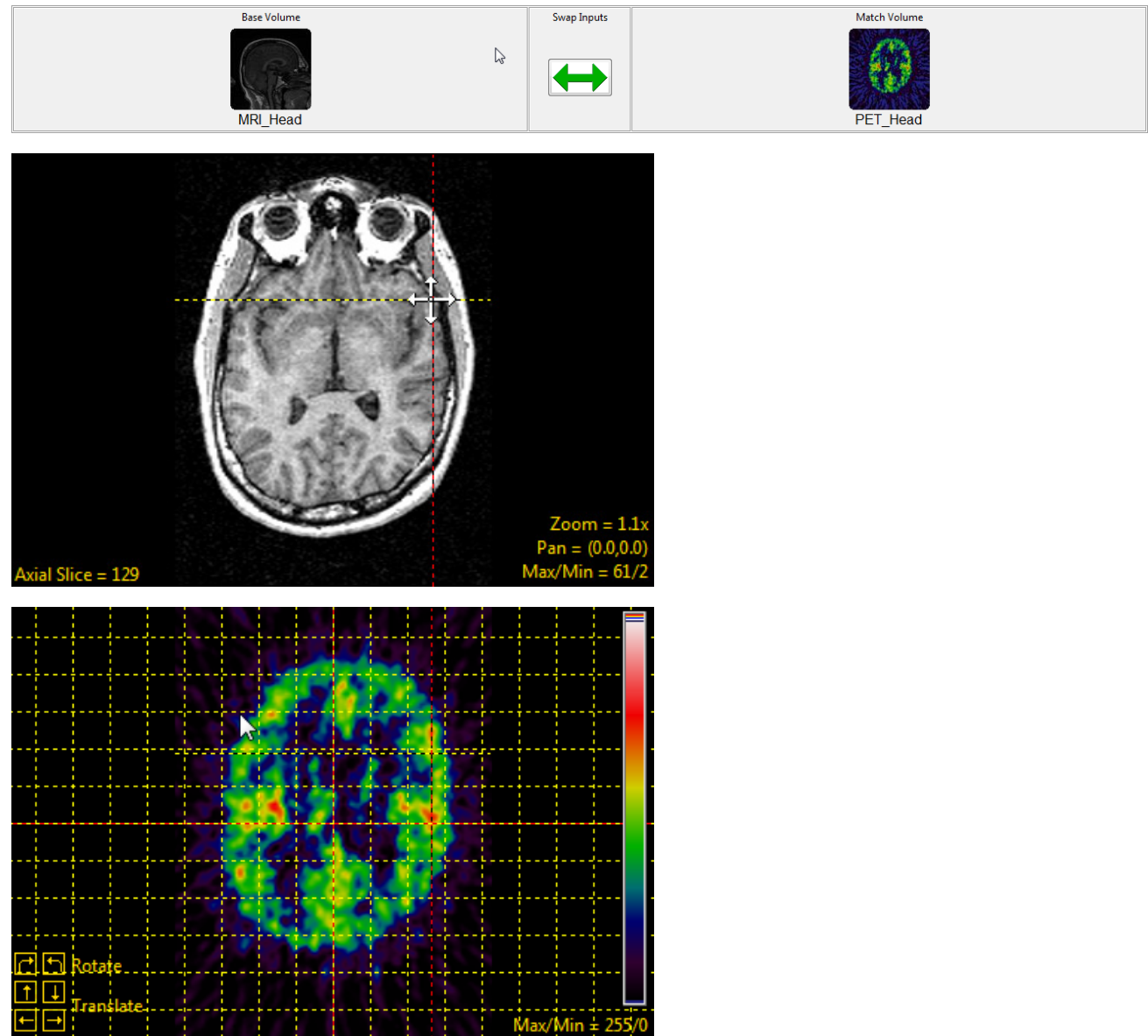
• On the left tool bar under Threshold, check the Show Thresholds option and the image display will show a red overlay representing all voxels that will be considered for the registration. Set the Base Minimum to 0 and the Match Minimum to 1.
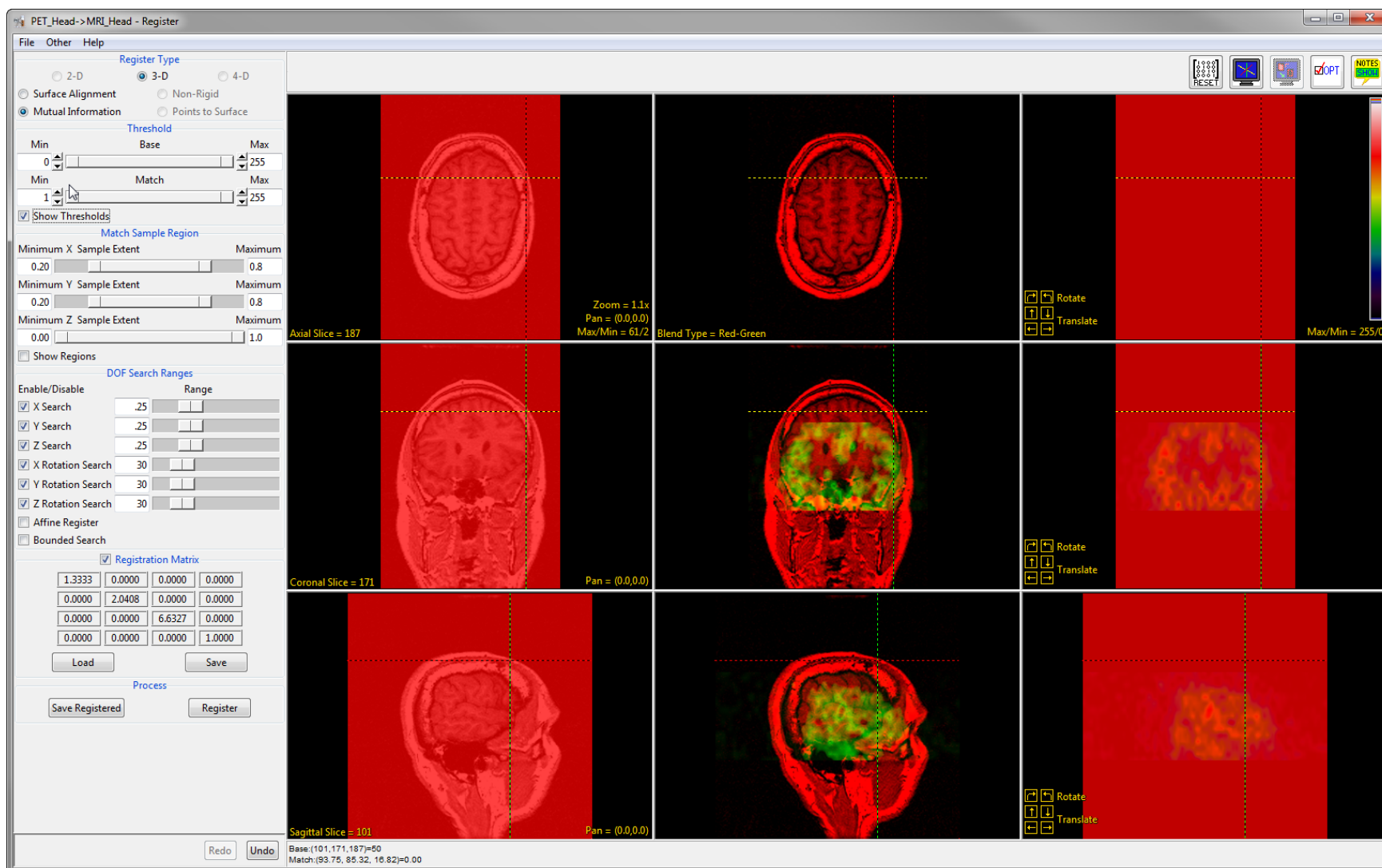
- Click the Register button.
- After registration is complete, you will see that the PET volume has been scaled, rotated and translated to match the sagittal MRI. Uncheck the Show Thresholds checkbox.
- Right-click the Blend Type yellow text in the middle upper panel and select Average.
- To evaluate the registration, move the crosshair in any of the panes.
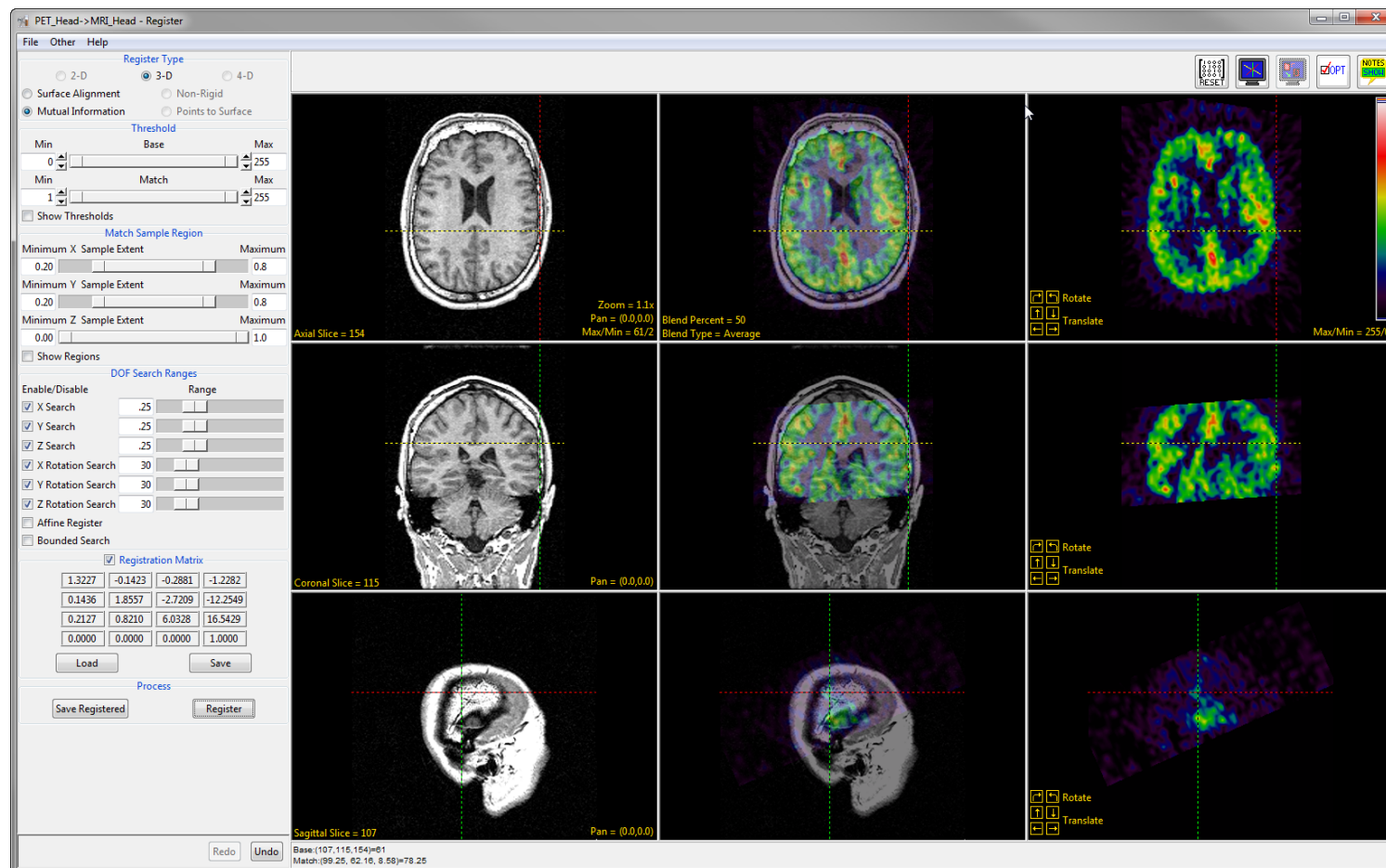
- If the registration is not satisfactory, you can choose to undo the last action using the Undo button at the bottom of the left tool bar.

- If you want to reset the data back to the original matrix, use the Reset button in the top right of the register window.

- To view the current transformation matrix, select the Registration Matrix box on the left tool bar. This gives the option to save the current matrix as an ASCII floating-point file or load a previously saved matrix.

- To save a copy of the transformed or fused match volume (PET_ Head), click Save Registered. Select the Transformed Save Type, Workspace, File and select Save Transformed.
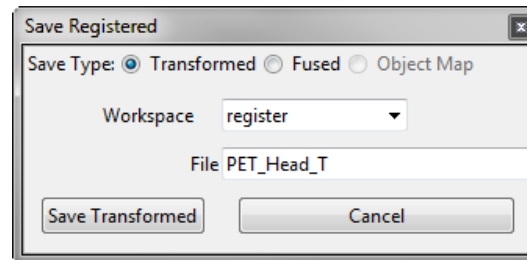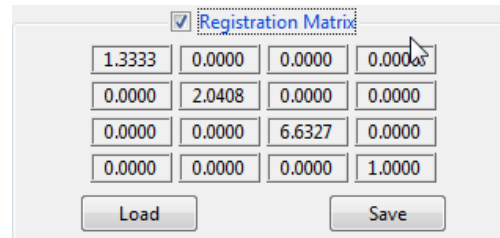
AnalyzePro also provides the ability to set a Match Sample Region and DOF Search Ranges.

Match Sample Region provides X, Y and Z sample extent sliders that define a specific spatial region used for registration. A dotted boundary line will appear on the right match image column.

The default region is optimal for MRI and CT volume images of the head. This tool can be useful for excluding excessive background or concentrating the registration on a specific region of interest.

DOF Search Ranges allow you to set the number of degrees of freedom. Clicking the Affine Register checkbox enables the scale and shear transformations for a fully affine transform.