

3D Non-Rigid Registration

Non-rigid registration allows for non-linear deformation in the registration transformation between volumes. This exercise will demonstrate how to use the 3D Non-Rigid Registration module.

1. Load both the **Heart_Time_Point_1.awv** and **Heart_Time_Point_2.awv** data sets from the **C:\BIR\images\TutorialData** directory.
2. In the Analyze workspace, first select the **Heart_Time_Point_1** data set. Then, while holding down **<Ctrl>** select the **Heart_Time_Point_2** data set (resulting in both being selected).
3. Open the **3-D Non-Rigid Registration** module (**Register > 3-D Non-rigid**).
4. Choose **File > Input/Output Ports** to ensure that Heart_Time_Point_1 is assigned as the 'Base Volume' and Heart_Time_Point_2 is assigned as the 'Match Volume' (figure 1).
5. To open the **Cursor Link** tool (figure 2), select **Tools > Cursor Link**. The cursor link will allow you to interactively review the data.
6. To change the orientation, open **View > Orientation**, select **Coronal**. To change the size of the data, select **View > Size**.
7. To set a blend mode, right click in the top-right display pane. Use the Section slider to navigate through the data.

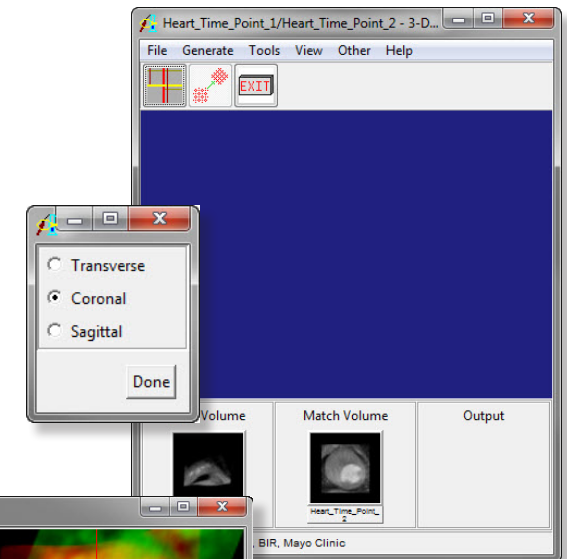


Figure 1

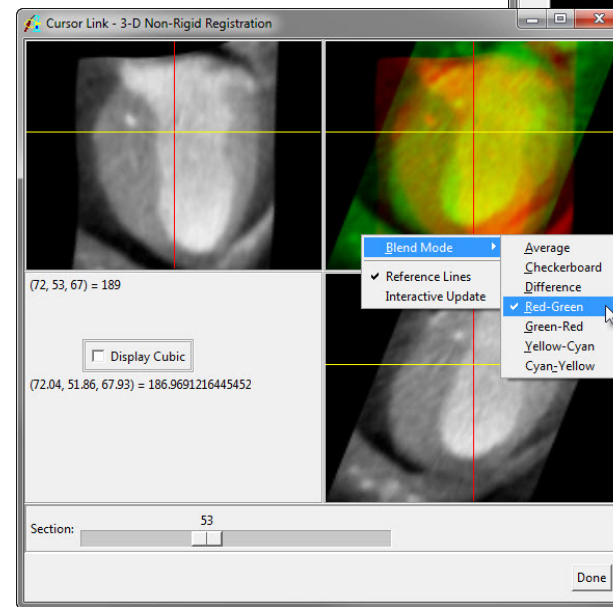
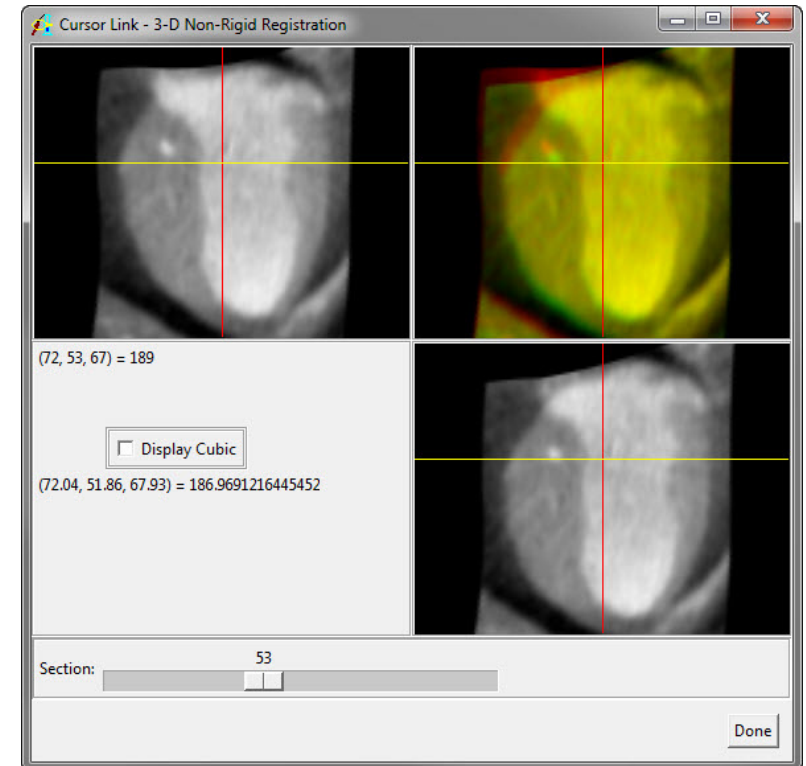


Figure 2

3D Non-Rigid Registration

8. Open the **Generate > 3D Non-Rigid NMI** window. This window gives the following options:
 - **Threshold:** specifies the clip values applied to the volumes before attempting registration. Check the Show Thresholding option and note the update in the Cursor Link image display as you adjust the threshold range, only voxels displayed in white will be considered for registration.
 - **Minimum Region Size:** specifies the scales at which the registration is conducted.
 - **Samples:** defines the number of samples used in each region for which the Mutual Information cost function is evaluated.
 - **Process:** sets limits of confidence for the registration.
 - **Minimum Entropy:** specifies the minimum histogram entropy in a subregion in order to be registered.
 - **Minimum NMI:** specifies the minimum NMI value for a registration result to be considered valid.
9. Once you have defined your parameters in the 3D Non-Rigid NMI window, click **Register** to initiate the non-rigid registration process.
10. Once the registration is complete, review in the Cursor Link tool (figure 3).
11. To output the transformed match volume to the Analyze Workspace, select **Generate > Transform**.



3D Non-Rigid Registration

12. Use the Volume Compare module to compare the original **Heart_Time_Point_1** and **Heart_Time_Point_2** data sets (figure 4). Then compare the original **Heart_Time_Point_1** and the transformed **Heart_Time_Point_2** data set (figure 5).

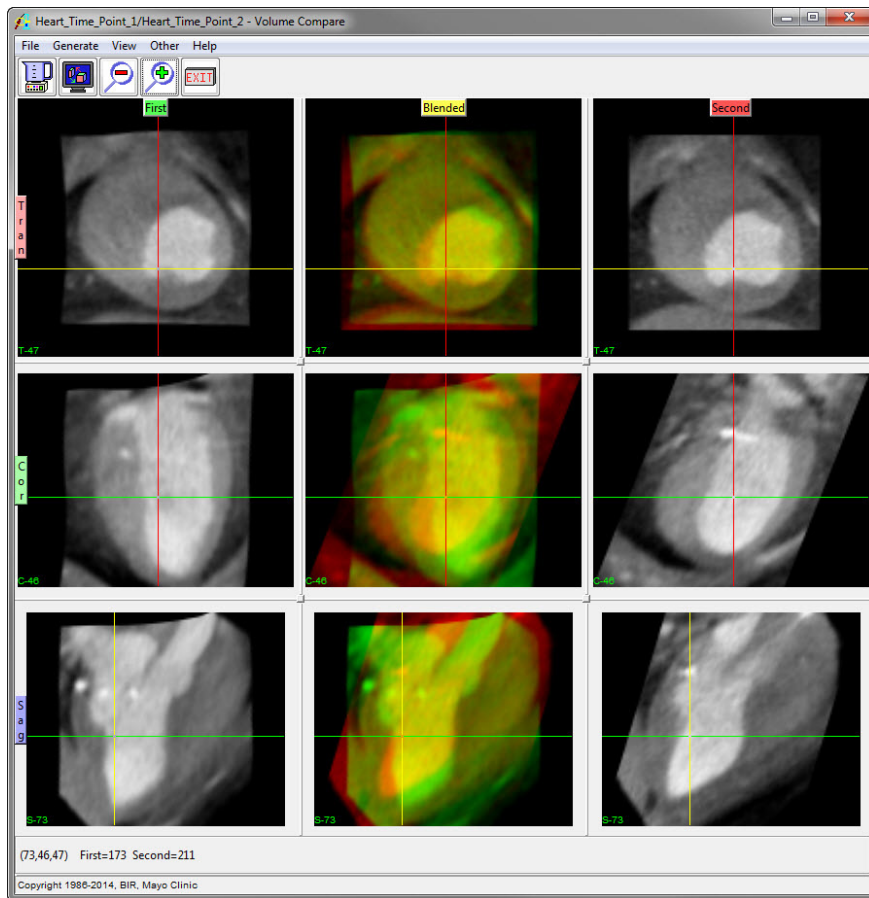


Figure 4

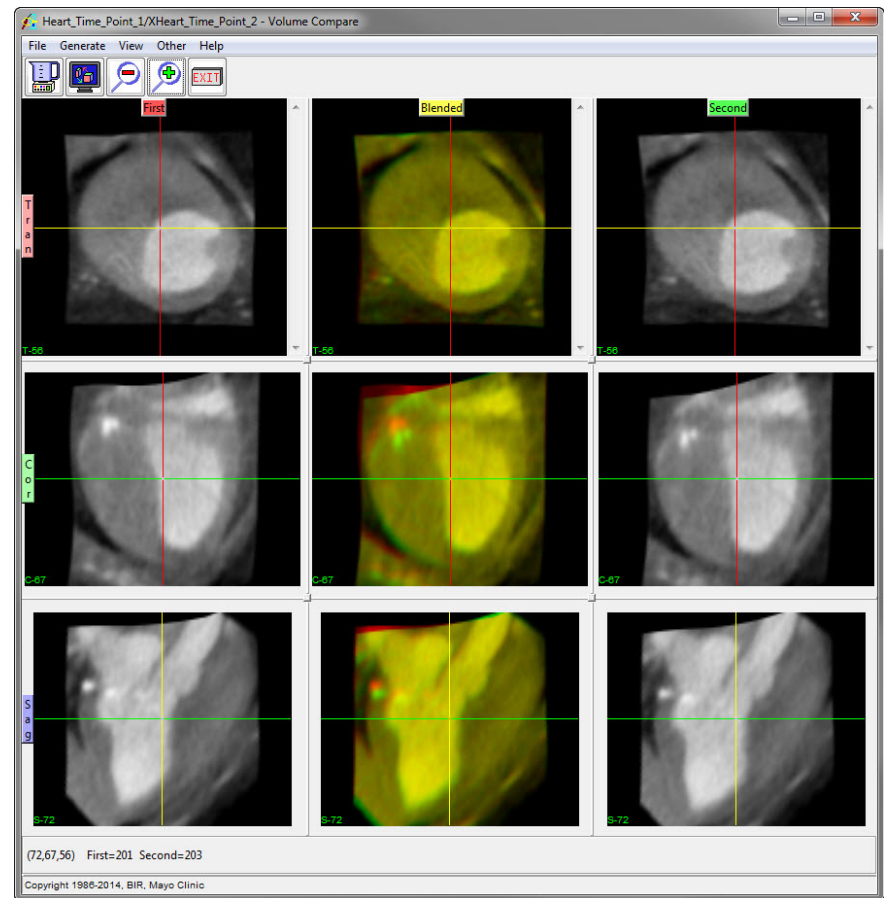


Figure 5