

Image Calculator: Image Manipulation

This exercise will demonstrate how to use the Image Calculator module for rudimentary image processing and manipulation.

1. Load both the **MRI_3D_Head.awv** and **MRI_3D_Brain_Bin.awv** data sets from the **\$(\BIR\images\TutorialData** directory.
2. With the **MRI_3D_Head** data set selected in the Analyze workspace, open the **Image Calculator** module (**Process > Image Calculator**).
3. In the Image Calculator module, the MRI_3D_Head data set icon should appear in the white space above the calculator (figure 1).
4. Click the **Multiply** button on the calculator.
5. Drag-and-drop the **MRI_3D_Brain_Bin** data set from the Analyze workspace into the Image Calculator module (white space).
6. This first manipulation demonstrates how to multiply a grayscale data set with a binary data set. The binary brain will act as a mask; all voxels in the grayscale data set that fall within the binary mask will be kept, while the voxels that fall outside will be removed.
7. Click the **Equals** button on the calculator. A dialog box will be returned stating that the action modifies the loaded volume, click **Change a Copy of the Loaded Volume**.
8. The masked grayscale data will appear in the Image Calculator module; a copy will be automatically be saved to the Analyze workspace.
9. Click the **Multiply** button again.
10. Click the **Matrix** button on the calculator.
11. The Matrix Tool will open (figure 2); set to **Rotate** around the **Z-axis 45 degrees** and click **Apply**. Click **Done** to close the Matrix Tool.
12. Click the **Equals** button on the calculator. A Transformation window will be returned; use the default settings and click **Transform**.
13. The transformed data will appear in the Image Calculator module and the copy in the Analyze workspace will be updated.



note In order to be able to drag-and-drop data sets from the Analyze workspace into the module, make sure that the Analyze window is not maximized to full window display.

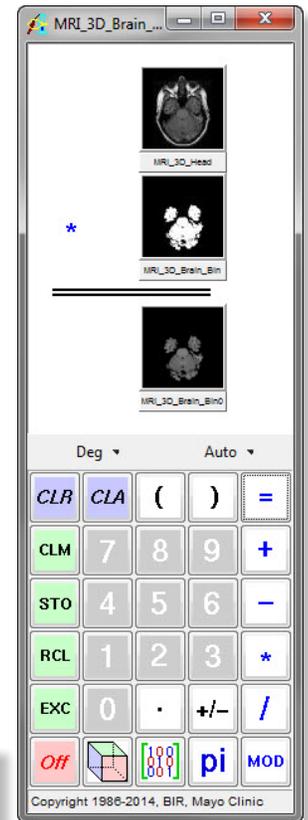


Figure 1

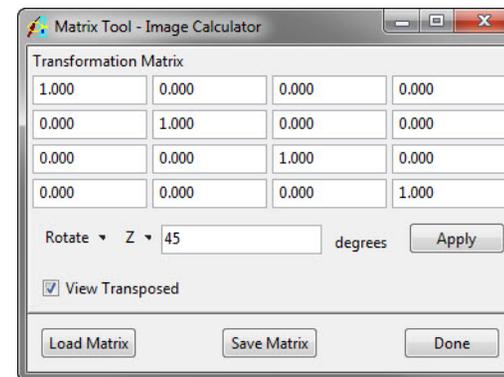


Figure 2

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14. Right-click on the calculator and choose **Buttons**; the Button Tool will open (figure 3).
15. The Button Tool includes a 'Palette' and 'Key Pad' (figure 3). To add a button to the main calculator, drag-and-drop it from the 'Palette' to the 'Key Pad' area of the Button Tool.
16. Click the **Flip** button that now appears on the calculator (figure 4).
17. In the Function Options window returned, check the **Flip X** option and click **Apply** (figure 5).
18. View the results by clicking the **Volume** button on the calculator.
19. A copy of the data set (as specified earlier) with the manipulations performed has automatically been saved to the Analyze workspace.
20. Close the Image Calculator module before proceeding to the next exercise.

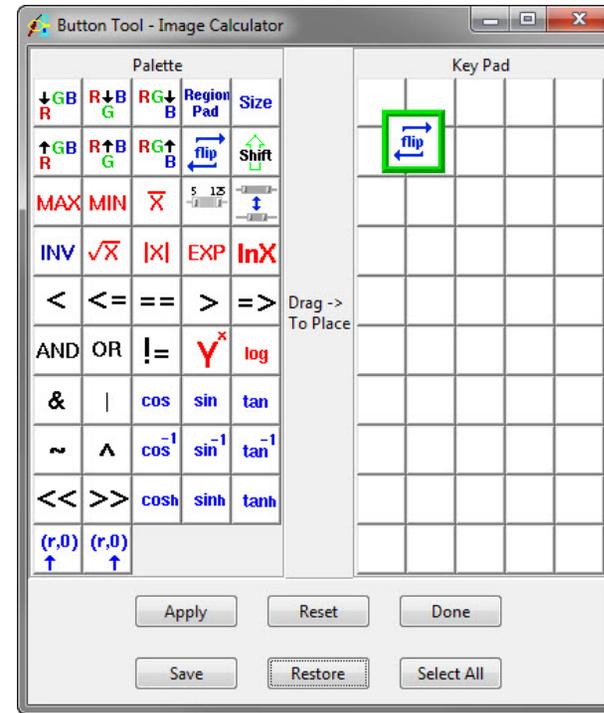


Figure 3

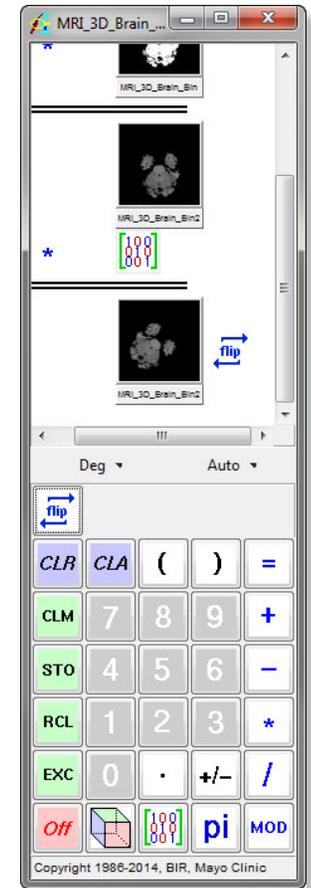


Figure 4

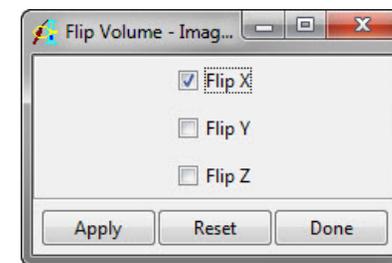


Figure 5