

Automatic frame alignment module

The frames of certain image volumes, e.g. the ones coming from mechanical slicing in 3D microscopy, are usually misaligned to each other. Such an example is shown in Figure 1.

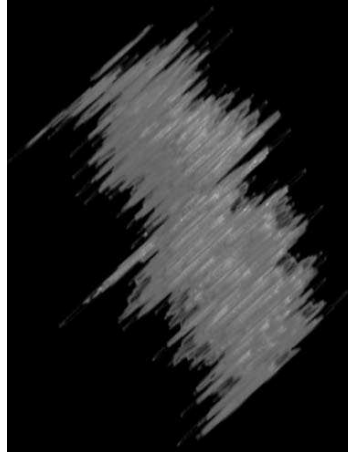


Figure 1: Misalign image volume.

Such volumes need manual or automatic alignment. EIKONA3D kernel provides a software tool for manual frame alignment. Automatic frame alignment is provided by the automatic alignment module. The volume Alignment module is implemented in `alignment.dll` file. If this DLL exists in the EIKONA3D folder, then, when EIKONA3D starts, it loads the DLL in a submenu with the name *Automatic Alignment* under the *Modules* menu. This submenu has the choice *Alignment*, which aligns a volume with no human intervention. If a user wants to align automatically a volume, he selects the input volume using the *Select Volume to Align* dialog box and he initiates the alignment procedure by pressing the button *OK*. A dialog box appears on screen asking for some necessary alignment initializations (Figure 2).

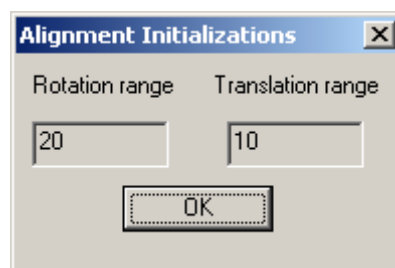


Figure 2: Dialog box with the necessary alignment initializations.

Initializations contain the rotation and the translation angles of the volume frames under consideration. The default initialization, covering a large number of alignment

cases, is the 20° (-20° , 20°) for the rotation and 10 (-10, 10) pixels for the x , y translation range respectively. However, if user believes that the volume under alignment has a smaller or larger rotation and translation range, then he can decrease or increase respectively those values. Attention! Those ranges MUST be positive.

When user finishes with the necessary initializations, the program is ready to start the alignment of the volume under examination, by just pressing the button *OK*. A status dialog box appears on screen indicating the status of the alignment procedure at each stage (Figure 3).



Figure 3: Status dialog box showing the status of the alignment procedure.

A result of automatic image volume alignment is shown in Figure 4.

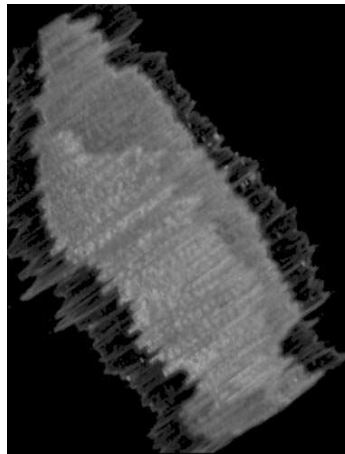


Figure 4: Aligned image volume.

Finally, when the volume alignment finished, the program ask user to give the name of the file that will contain all the alignment transformations. If the user wants to save the transformation file, he selects the desired path and name of the file and presses the *OK* button. This is a text file that contains the rotation (in degrees) and the translation in (x,y) coordinates for each volume frame. The (x , y) coordinates are saved as float

variables for increased accuracy but they are rounded prior to display. The point (0, 0) is the upper, left corner of the frame. Saving this file is optional, that is, if user presses the *Cancel* button, the program just by-passes this procedure and continues to the last alignment stage, where the program asks user to select the output buffer in order to display the aligned volume (Figure 5).

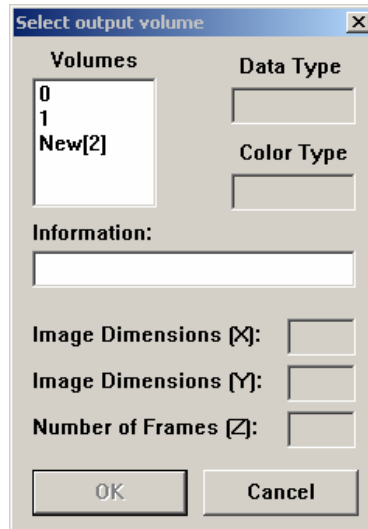


Figure 5: Dialog for selecting the output volume.