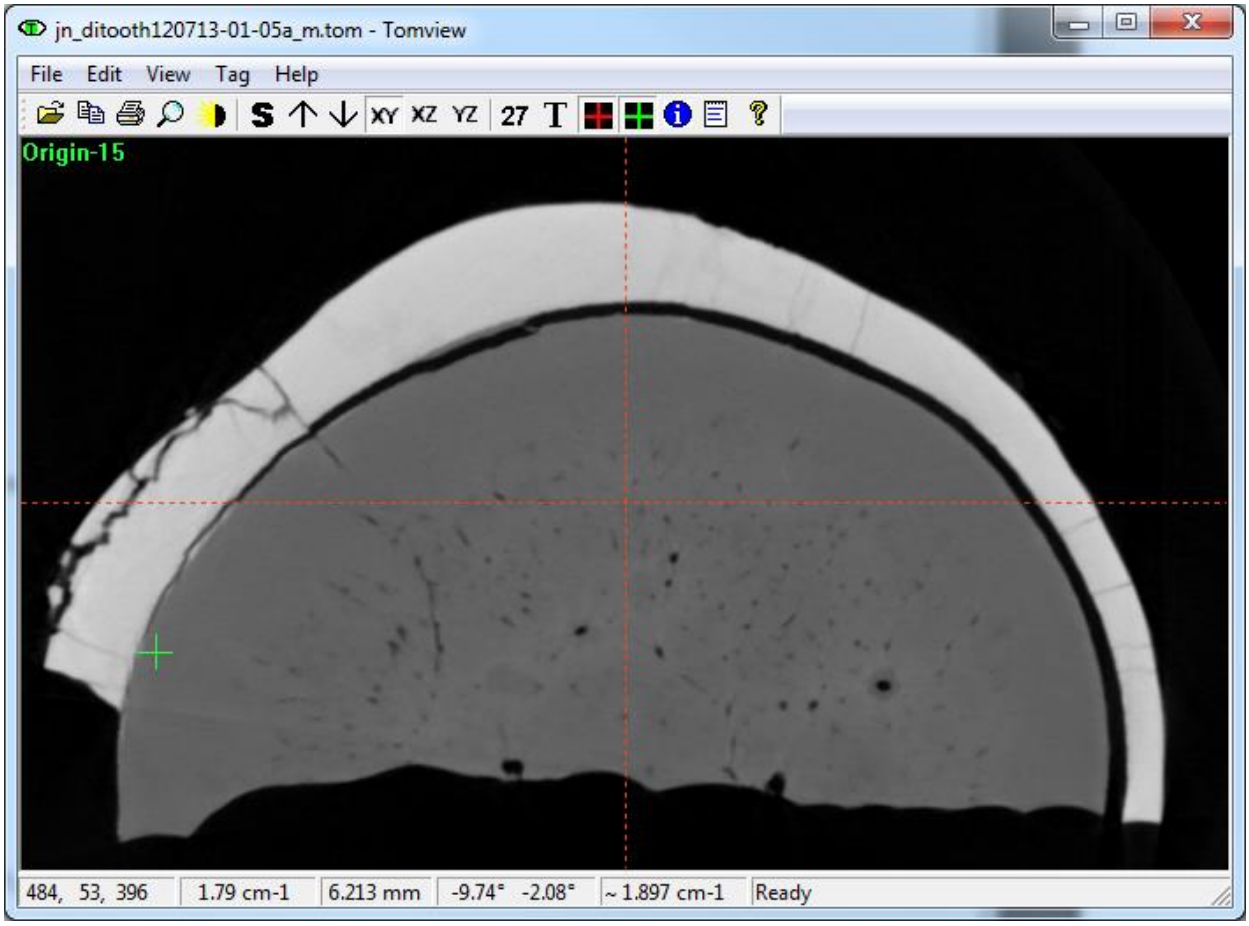
Tomview: A slice viewer for 3D X-ray tomography files



The purpose of Tomview is to allow for simple viewing of X-ray microtomography files generated by the MuCAT XMT facility at Queen Mary University of London. It allows 2D slices to be viewed in either the XY, XZ or YZ planes. Its purpose is primarily for exploration of the data sets, rather than analysis.

Screen description

The main window shows the currently selected slice at zoom levels of between 100 and 500 % (selectable using the zoom toolbar button or from the “view” menu). The window size is set according to the data size. The zoom is normally set to 100 % when a new file is loaded, but for small images a larger value will be set to avoid cropping the toolbar or status bar.

The red dotted lines are “slice bars”, showing which slices will be viewed when switching to one of the other orthogonal view planes. These can be toggled on and off using either the red dotted button on the toolbar, or from the “view” menu.

The green cross shows the position of a moveable “origin”. This is positioned in the current slice by right clicking the mouse. The green text in the top left of the window shows the number of slices between the current slice and the slice in which the origin was defined (set to zero when the right mouse button is clicked). The origin marker is toggled on and off using the green cross button on the

toolbar or from the “view” menu. By default it is off, but is turned on at the first right click.

Status bar
The left hand three numbers in the status bar (bottom of window) give the x, y and z coordinates respectively of the mouse cursor. The number following this is the linear attenuation coefficient at this position. The following number is the distance from this position to the origin. The angle from the origin to the cursor is shown firstly as projected onto the XY plane of the origin and secondly as the angle between this plane and the cursor. The average linear attenuation coefficient in a cuboid whose opposite corners are the origin and the cursor (with faces parallel to the XY, XZ and YZ planes) is given in the 5th status box.

Contrast/brightness
The contrast and brightness controls can be accessed either from the “view” menu or from the toolbar. Contrast is expanded in powers of 2, from the original 256 grey level (minimum) to a binary image (maximum). The reset button in the Contrast/Brightness dialogue restores the original greyscale values. From this menu it is also possible to load a colour look-up table (LUT). This allows a different colour to be assigned to each of the 256 grey levels. The format of the LUT file is the same as that used in ImageJ and thus it is possible to use ImageJ to create and edit these files.

Selecting Slices
Slices are selected either from the “view” menu, or by clicking on the “S” toolbar button. This brings up a dialogue window that will allow the XY, XZ and YZ slices to be changed. When changing the slice corresponding to the currently selected view plane, the image will be updated accordingly. Otherwise the slice bars (dotted red lines) will move. The view plane can be selected from the same dialogue. The status bar information will not be updated whilst this dialogue is open.

The up and down arrows on the toolbar can also be used to increment the slice up and down. Scrolling the mouse wheel will have the same effect. The “XY”, “XZ” and “YZ” toolbar buttons can also be used to switch between planes.

Alternatively, for quick navigation around a specimen, the slice bars can be moved instantly by left clicking the mouse.

27 voxel average
Clicking on the “27” button toggles 27 voxel average mode. When enabled, the linear attenuation coefficient in the second status box represents the average value in a 3X3X3 voxel cube centred on the cursor.

Tagging
Clicking the “T” button toggles Tag mode. When this is enabled, clicking the left mouse button defines a tag at the cursor position. This will show up as a filled

red sphere (shown as a circle in the slice) when Tag mode is enabled and as a hollow sphere when disabled. When Tag mode is enabled left clicking no longer moves the slice selection. Right clicking within a sphere when in Tag mode will delete the corresponding tag (the origin will not be moved by right clicking when in Tag mode). The sphere radius can be changed from the Tag menu. This menu can also be used to clear, load and save tag files (".ttg" extension). The ttg files contain the x,y,z coordinates of the tags in ASCII and can thus be imported into a variety of programs.

Metadata
Use the "i" toolbar button to display the header information, or use the notepad button to copy metadata to the clipboard.

Copying and Printing
The current slice can be copied to the clipboard using either the "edit" menu, copy toolbar button or "ctrl c" keys. It can be printed using either the "file" menu, print toolbar button or "ctrl p" keys. In both cases, the origin and slice bars are not shown.

Exporting / Bitmaps
The entire data set can be exported as a stack of bitmaps, either in the XY, XZ or YZ planes. First select the appropriate plane using the viewing options (above). From the file menu, select "Export" and then "Bitmaps". When the file dialogue appears, you can select or create a new directory for the exported bitmaps. If you create a new directory, remember to go into that directory before entering the file name. The exported bitmaps will have a 4 digit number appended to the file name, indicating the corresponding slice.

Since these bitmap images are influenced by the contrast/brightness settings, it is normally best to reset the greyscale (see above) before exporting.

Export / PVL for Drishti
Selecting this menu item (under edit) immediately creates a ".pvl.nc" file that can be opened by Drishti. The original ".tom" file must be in the same directory as the created "pvl.nc" file contains only metadata that refers to the tom file.

Export / ImageJ
Selecting this menu item (under edit) immediately creates a ".ijm" ImageJ macro file. In ImageJ, select Plugins / Macros / Run. Units will be imported as mm and cm^{-1}.

Export / Crop
This is used to define a bounding cuboid and save a region under a new name.