A Tutorial on OsiriX software

Introduction

Osirix is a freeware program available to the public on the Apple Inc. Website. Biomedical Visualizers can use this software to visualize anatomical data sets and extract visual information for reference.

Getting started

Osirix software 32 bit version can be downloaded at http://www.osirix-viewer.com/. You can also purchase the 64bit version there. You will need to unzip the program by double clicking on the desktop icon. Then double click the Osirix Installer icon and it automatically installs to the location you designate. The DICOM files can be used in Osirix and are created from CT, MRI and PET medical equipment.

NB: You need to learn how to make DICOM images from the Pharmascan!

For online help: http://www.osirix-viewer.com/Learning.html. Here you can buy OsiriX user manuals. You can also get help on Wiki: http://en.wikibooks.org/wiki/Online_OsiriX_Documentation/FAQ.

Navigation

Osirix navigation is accomplished by using three main windows. The first window you will see is the Database Window. This is where data sets are imported. The second window is the Viewer Window; it is opened by selecting the 2D-3D viewer button in the first window's toolbar. This window allows for viewing and manipulation of 2D (two-dimensional) data sets. The third window is specific to the type of 3D (Threedimensional) rendering tool you select under the 2D/3D button. The window 3D Volume Rendering is shown here. This window allows for viewing and manipulation of 3D data sets.
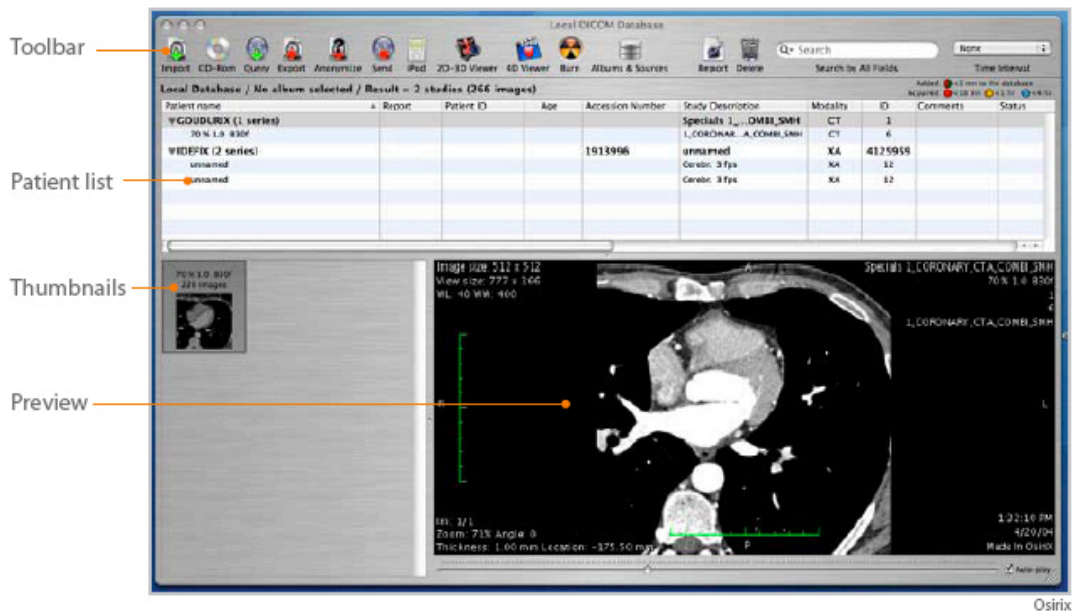

Window 1: Database window

The Database window has a main toolbar, patient and study list, image thumbnails and a preview pane. This organization window lists the imported data sets and allows you to preview the images. Images are imported by clicking on the Import icon.

The toolbar can be customized by selecting Customize Toolbar from the Format menu. Then simply drag and drop the icons in or out of the toolbar. Three icons I would recommend removing are Query, Send and Report, since they pertain to working in a PACS (Picture Archiving and Communication System workstation). A PACS workstation is used by radiologists to coordinate image workflows from CT, MRI and PET scanners. To view a specific set of images select the name of the series you would like to open in the patient and study list. Then click on the 2D-3D viewer button in the toolbar. This will open the Viewer Window.
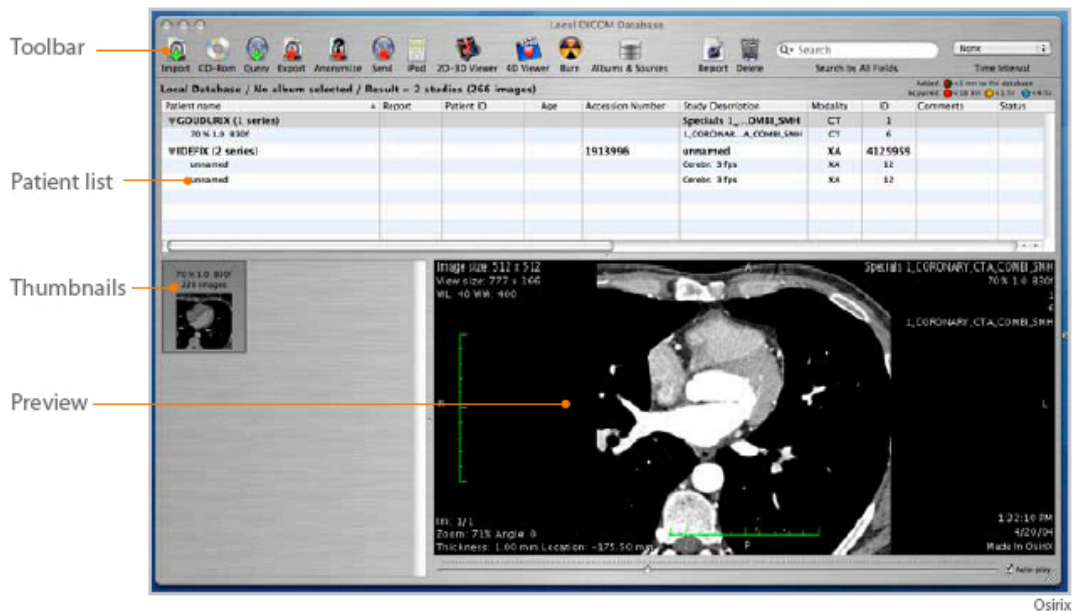

Window 2: Viewer window

The Viewer window displays data sets from a select series and allows you to manipulate 2D images. The Viewer window has a main toolbar, image thumbnails and a preview pane. If you click on the Database tool the Viewer

window will close. Move the mouse in a horizontal direction to change contrast and a vertical direction to change intensity when using the Contrast and Adjustment tool. Contrast is also referred to as Window Length (WL) and intensity as Window Width (WW). The tool WL & WW has some preset contrast and intensity settings in the pulldown menu. The CLUT (Color Look Up Tables) tool is used to assign color to the images.

The 3D viewer is accessed by clicking on the 2D/3D viewer button pulldown and making a selection. There are two sections to the pulldown menu. The first section uses 3D data to create a 2D image with MPR (Mulitplanar Reformatting). There are oblique, curved and orthogonal MPR options. An Oblique MPR of the heart allows the heart to be represented in a 2D image at the angle it is positioned in the body. The Orthogonal MPR allows you to interact with a given point on the body in axial, coronal and sagittal views simultaneously.
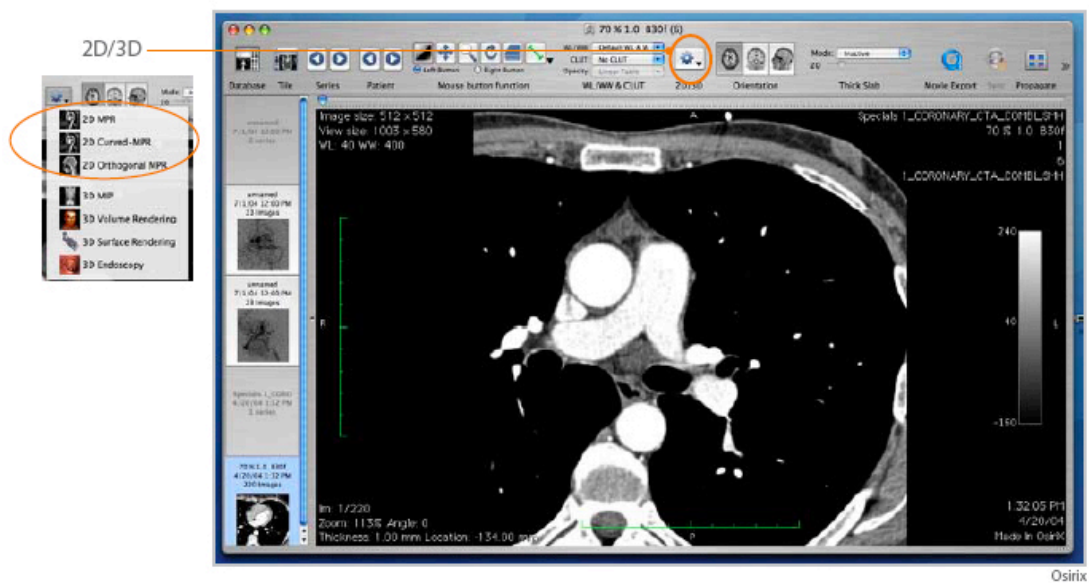
The second section of the 2D/3D viewer button pulldown menu creates 3D images in MIP (Maximum Intensity Projection), 3D Volume Rendering, 3D Surface Rendering and 3D Endoscopy. The 3D MIP selection displays contrast enhanced images to define vasculature. The 3D Volume Rendering selection can have different colors and transparencies assigned to different tissue types. In this way bone, muscle and skin can be defined. The 3D Surface Rendering selection creates surface triangles much the same way 3D design or CAD programs do. The 3D Endoscopy selection allows you to navigate through a lumen to view internal structures.

Database window import

There are two types of sources for Osirix image data: public and private. Many public offerings are available downloads on the internet. These include the previously mentioned Osirix website and other public sources. The second source is privately supplied data. It is now possible with Osirix to request DICOM files from CT, MRI or PET scanners for reference when working with clients.

Osirix accepts many file formats. These file formats include DICOM, TIFF, JPEG, PDF, AVI, MPEG and Quicktime.

Exporting images

Images can be exported from Osirix by numerous means. DICOM images can be exported with the Export tool. Selecting Export under the File menu allows you to export to Quicktime, jpeg, raw, tiff, DICOM, email and iphoto. The Burn tool burns files to a CD with the Osirix viewer included so others can view the files. Images can be exported to an iPod to be stored or viewed. To export images to store, connect the iPod to the computer and click on the iPod tool. To export images to view, select export under the file menu and select iPhoto. Create an album in iPhoto for Osirix images then open iTunes. Select the iPod and click on the Images tab. You can select the Osirix folder to be viewed. In the future you will be able to store Osirix images on your iPhone.

DICOM, Quicktime movies, Quicktime VR movies and Fly Thrus can be exported in the 3D window. Click on the DICOM tool to export a new set of DICOM images to a desired location. The Quicktime tool generates a 180 or 360 degree movie. The Quicktime VR tool creates an interactive movie that you can rotate in real time. The Fly Thru tool allows you to create a dynamic image sequence. Click on the fly thru tool and a dialogue box allows you to add or delete images by clicking on the Plus or Minus signs. Change the angle of the object, zoom in and out, and affect the contrast and intensity levels while adding these to the fly thru. In order to view the movie click on the Movie tab in the dialogue box. Click on Compute and under the Frame section play the movie. If the movie jumps, try adding extra transition images when creating something like an intense zoom. To export the movie click Save in the Movie tab to export a Quicktime movie.

2D Viewer window ROI

Pulldown menu
other ROI tools

Osirix
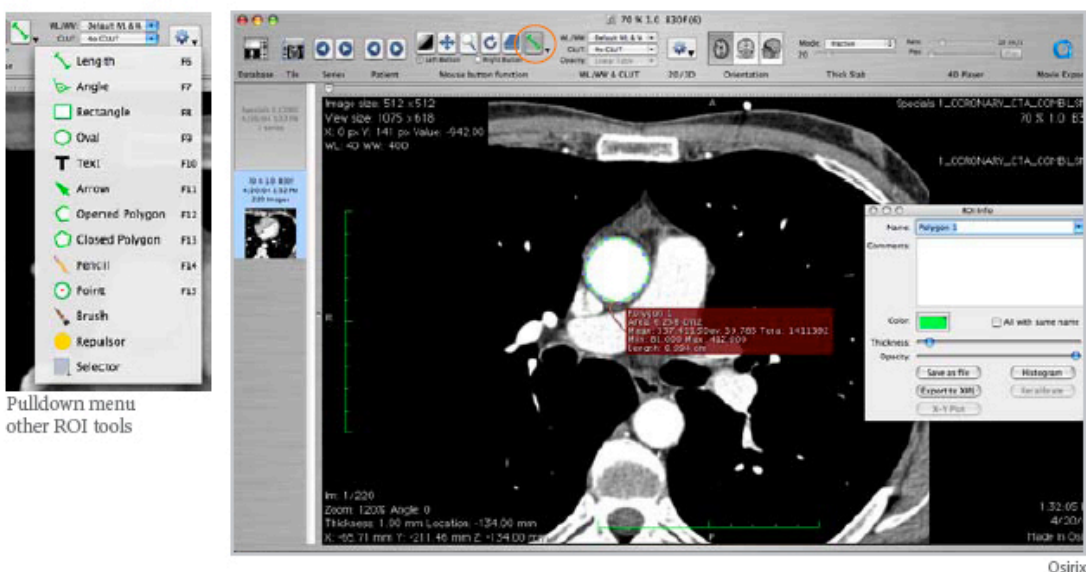
ROI stands for Region Of Interest. Tools in the ROI pulldown menu will draw Ovals, Lines, Rectangles and Polygons. Text and Arrow annotations can be made

on the image. Length and Angle measurement tools are available. Points can be added and a Brush used to select areas. The Repulsor tool manipulates the ROI already created, and the Selector tool makes multiple selections. By double clicking on any region of interest a dialogue box appears that allows you to change line weight, color, grayscale and text size. The ROI can be turned on or off for any file. The Propagate tool allows you to apply the ROI to various slices. Region Growing allows you to select a point and it will grow the area to include similar pixel density ranges.

3D Surface Rendering

After selecting 3D Surface rendering a dialogue box appears. This box has Predefined Pixel Values for the first and second surfaces. A transparency can be added to visualize the surface beneath. The Resolution and Smooth Iterations can be adjusted with trial and error to better represent the form of the object that is being created with triangles on it's surface. A Ray-trace rendering effect is generated on the surface using these parameters to apply shading, lighting, color and transparency to the object.