

osirix-viewer.com/Snapshots.html

# OsiriXasa Iesource

by Tonya Limberg © 2008, MS, Biomedical Visualization, University of Illinois at Chicago

## 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.

This tutorial is directed to the novice user for visualization needs. I found that the resources I came across for Osirix were primarily for the radiologist or computer programer. I will share with you my personal experiences learning this program and what I found useful for Biomedical Visualizers.

I have included **Terms you can use** throughout the tutorial and there is also a list of terms at the end of the tutorial for your reference.

Any questions or comments can be directed to tlim berg@wi.rr.com. I hope you find this tutorial useful.



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www.apple.com/downloads/macosx/imaging\_3d/osirix.html



pubimage.hcuge.ch:8080/



## Getting started

To get started you can download the Osirix program at: www.apple.com/downloads/macosx/imaging\_3d/ osirix.html

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. Public image data sets can be downloaded to your desktop at: pubimage.hcuge.ch:8080/

The **DICOM** files can be used in Osirix and are created from **CT**, **MRI** and **PET** medical equipment. The file sizes are listed for your reference.



### **TERMS YOU CAN USE**

DICOM File extension – .dcm Digital Imaging and Communications in Medicine.

The DICOM file standard is used in image and patient data from CT, MRI and PET medical imaging equipment.

CT

### Computed Tomography

Image sections are created from a 2D Xray moving around a single axis. They form a 3D image of internal anatomy.

### MRI

### Magnetic Resonance Imaging

Magnetic field is created around anatomical structures creating an image.

### PET

### Positron Emission Tomography

3D image of metabolic activity is created using gamma rays that interact with a metabolically active molecule.



Window 1 Database window



Osirix

### Window 2 Viewer window



Osirix

Window 3 3D volume rendering



## 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.

### **TERMS YOU CAN USE**

Database Window (com+D) import data sets

Viewer Window view and manipulate 2D data sets

3D Window view and manipulate 3D data sets





### TOOLS YOU CAN USE



Import import data



CD-Rom import from cd



Export export data



Anonymize remove ID



iPod export to iPod





svnc PET and CT scans



1

Burn burn cd



Sources create data sets

### **TERMS YOU CAN USE**

PACS Picture Archiving & Communication System

Used to coordinate workflow of scans



## Navigation

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. Other toolbar icons are described in the sidebar on the right.

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

Window 1 Database window

Report, since they pertain to working in a PACS (Picture Archiving and Communica-

tion 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.



Osirix



# **OSITIX**asa

### **TOOLS YOU CAN USE**



Database return to window



tile view



Series previous/next



Patient previous/next



Adjustment contrast & intensity



Zoom

shift key





through image set





WL & WW preset contrast and intensity



CLUT Color Look Up Tables assign color

# Navigation

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

## Window 2 Viewer window

### 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.





### TOOLS YOU CAN USE



Orientation plane of reference



Thick Slab change slab thickness



Movie Export create a Ouicktime movie



Browse display cine images



Rate speed of browse button



**3D Panel** data in 3D



Print print image



Sync applies changes to all images



Propagate ROI to all images in stack

## Navigation

Two export features in the viewer window are **Movie Export** and **Print**. The rest of the tools featured on this page use 3D representation in the 2D viewer window.

The Orientation tool allows the flexibility of changing between axial, coronal and sagittal views in the preview window. The **3D** tool displays data in **3D** in a separate window. The **Thick Slab** tool increases the original thin slabs to a thicker viewing to increase viewing depth.

Window 2 Viewer window

Browse gives a dynamic display of static images. The rate at which Browse moves through the stack is determined by moving the **Rate** slider to the right of the Browse tool.

Propagate and Sync apply changes throughout the stack.







• open 3D window



Oblique planes across data





Curved planes across data



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### Axial, coronal, sagittal planes



**TERMS YOU CAN USE MPR** Multiplanar Reformatting slicing through data in a new way

## Navigation

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.

### Window 2 Viewer window

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. Using a Curved MPR creates a 2D representation of a dentagram. The Orthogonal MPR allows you to interact with a given point on the body in axial, coronal and sagittal views simultaneously.



# OSITIX as a

### **TERMS YOU CAN USE**

MIP Maximum Intensity Projection high contrast for 3D object

### **TOOLS YOU CAN USE**





Tissue intensity values



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osirix-viewer.com/Snapshots.html

# Navigation

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.

Window 2 Viewer window

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.



## Osirix<sub>as a</sub> resource

### TOOLS YOU CAN USE Contrast Adjustment contrast & intensity Move and Pan command key Zoom shift key Rotate horizontally move Manipulate around center of gravity Angle of View camera position Length measure distance **Tag Reference Points** $\mathbf{G}$ specific feature Sculpt 3D Object 3< scissors cut out Bone Removal 2 removes bone WL/WW: Other preset contrast and intensity CLUT: VR Muscles-Bones Color Look Up Tables assign color Opacity: Logarithmic Table **Opacity** preset opacities Detail Coarse fine course

# Navigation

## Window 3 3D Volume Rendering

The third window appears once a selection has been made from the 2D/3D viewer button pulldown menu. This windows is titled according to the selection chosen. The 3D window has a main toolbar and preview pane.

The Contrast, Move and Pan, Zoom, Rotate, Length, WL & WW and CLUT tools are the same as in the Viewer window. Note that color can be manipulated in the histogram when making a bit selection at the bottom of the CLUT pull-down menu. Preset opacities are available in the Opacity tool. The Manipulate tool moves the object around it's center of gravity. The camera position can be changed with the Angle of View tool. A Tag Reference Point tool is used to point out a specific feature. The Sculpt 3D Object tool acts as a scissors. Material is outlined by clicking points to form a shape to be deleted. Click on a bone with the Bone Removal tool, and it will remove it. Detail can be adjusted in the Fine /Course slider.



# **OSITIX**as a

### TOOLS YOU CAN USE



**Best Rendering** 



Crop Volume frame to crop



toggles box in corner on/off





Engine Ray cast 3D texture Stading Ave





Diffuse: 0.9 Edit Specular :0.3-15.0

Shading advanced

# Navigation

Other tools for the 3D Volume Rendering window include the Best Rendering tool. This tool renders the image at it's best resolution.

The Crop Volume tool has a wire frame that creates a box around the object to crop it. The Orientation tool toggles the visibility of the orientation box in the upper right corner of the preview window.

### Window 3 3D Volume Rendering

The DICOM file tool exports DICOM files.

An animated movie can be created with the Fly Thru tool that can be inserted into Microsoft PowerPoint.

Ray cast and 3D texture can be applied with the Engine tool pulldown menu. Advanced tools in Perspective and Shading are also available.

#### Index of ftp://ftp.erl.wustl.edu/pub/dicom/

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READER	1 80	1/20/00	12:00:00	м
acc1795		1/20/00	12+00+00	ж
Seages		1/21/00	12,00,00	A.K
acfueare		1/21/08	12,00,00	м



### DATA WEBSITES

### pubimage.hcuge.ch:8080/x

sourceforge.net/proj ect/showfiles.php?group id=107249&package\_ id=165209&release id=360395

www.nlm.nih.gov/re search/visible/visible\_gal lery.html

www.barre.nom.fr/ medical/samples/

ftp://ftp.erl.wustl.edu/pub/ dicom/

ftp://ftp.nlm.nih.gov/vis ible/bitmaps/color24/

#### Index of ftp://ftp.nlm.nih.gov/visible/bitmaps/color24/



nlm.nih.gov/research/visible/visible\_gallery.html Sources for data

### 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 listed in the sidebar at the right.

The public data is de-identified. It has been stripped of any patient identification.

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.

It is important to ensure that patient data is provided without identity or ID markers attached.

# DICOM JPEG TIFF PDF AVI Quicktime

## File formats

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

TIFF (.tiff) or Tagged Image File Format stores image data in tags. It does not lose file data when it is compressed and therefore is referred to as lossless compression. The TIFF has advanced pixel data types for scientific imaging. JPEG (.jpg) or Joint Photographic Experts Group uses lossy compression and may lose data if saved multiple times. There is a 12-bit jpeg for medical systems. PDF (.pdf) or Portable Document

### Database window import

Format is independent of software, hardware or OS. It can contain text, fonts & images. **AVI** (.avi) or Audio Video Interleave contains audio & video data. The **MPEG** (.mpg) or Moving Picture Experts Group contains video & audio data and has various compression formats. **Quicktime** (.mov) is a video, media, sound, text, animation and image interactive file format.

The file formats were tested with Osirix and all imported to confirm compatibility. No file formats have been found at this time that need to be converted.



### **TERMS YOU CAN USE**

TIFF (.tiff) Tagged Image File Format. Stores image data in tags. Lossless compression. Advanced pixel data types for scientific imaging.

JPEG (.jpg) Joint Photographic Experts Group. Lossy compression. 12-bit jpeg for medical systems

### PDF (.pdf)

Portable Document Format Independent of software, hardware or OS. Text, fonts & images.

AVI (.avi) Audio Video Interleave. Audio & video data.

MPEG (.mpg) Moving Picture Experts Group. Video & audio data. Compression formats.

Quicktime (.mov) Video, media, sound text, animation, interactive



## Export 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.

I would recommend storing files on a CD or iPod to reduce the amount of space taken up on your hard drive.



### TOOLS YOU CAN USE



Export export data



iPod export to iPod



Burn burn cd

to	Quicktime	e #S
to	Quicktime	e VR
to	JPEG	企業E
to	RAW	
to	TIFF (386	企業F
to	DICOM	
to	Email	
to	iPhoto	
	to to to to to to	to Quicktime to Quicktime to JPEG to RAW to TIFF to DICOM to Email to iPhoto

File Menu – Export format selection



Osirix



### TOOLS YOU CAN USE





Movie Export create a Quicktime movie



VR Movie Export create interactive Quicktime movie



DICOM, Quicktime movies, Quicktime VR movies and Fly Thrus can be exported in the 3D window.

Export 3D

Click on the **DICOM** tool to export a new set of DI-COM 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.



### **TERMS YOU CAN USE**

Angiogram Static or dynamic. Used to visualize the lumen of vessels or organs. Contrast agent injected shows up on x-ray.

### TOOLS YOU CAN USE

Subtraction Mask Separate dynamic portion of image from the rest.

#### Convolution Filters

Enhance image for further separation.

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Next Series	36
Previous Series	36 +-
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Convert to IIW	
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Calibrate Resolution	
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Display DICOM Overlays	2007
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	Laplacian #
	Imanete
	Second and Advent
	Sharpen
	Add a Filter



Before subtraction





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osirix-viewer.com/Snapshots.html

# Technique

## 2D and 3D Window Vessel Separation

Vessels in angiograms can be separated out using the subtraction mask.

A **Subtraction Mask** can be used with the Browse tool to preserve areas of the image that move over time and remove those areas that do not. In this way the vessels will be separated from the rest of the image.

Add the **Subtraction** tool to the toolbar by accessing Customize Toolbar from the Format menu. Select the mask image that was created pre-injection and click **Mask** in the subtraction tool. Then click the browse tool and the image mask will be subtracted from all of the dynamic images post-injection. The mask can be turned **On** and **Off** in the upper left of the subtraction button.

Filters can be applied to enhance the image for further separation. These can be found under the 2D Viewer menu. Select **Convolution Filters** to make your filter choice.

2D subtracted vessels can be visualized in 3D when using MIP. The **3D MIP** selection displays contrast enhanced images to define vasculature and organs.



## Osirix<sub>as a</sub> resource

### **TERMS YOU CAN USE**

ROI Region Of Interest emphasized area on image

### TOOLS YOU CAN USE



Propagate ROI to all images in stack

R01 Plugina Window Help	
Import AOI	
Import ROI from XML	
Save Selected RONS)	
Save ROILD as DICON SR	
Delete All ROIs in this Series	**
ADI Manager	
ROLInfo	
ROI Rename	
Set Default ROI Name	
Display Info Only when ROI Selected	
Display Name Only	
Histogram of Selected ROL.	
Compute Volume of Selected RDI	
Propagate Selected ROL.	
Propagate Selected ROI to Current Trick Slab	-5
Group Selected ROIs	XWG.
Unproup Selected ROIs	.CHU
Set Pixel Values to	
Grow Region (2D/3D Segmentation)	
Brush ROI Filter	

Grow Region similar pixel densities added to pixel selected

## Technique

# 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.

2D Viewer window ROI

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.





Osirix - grow region tool



## Technique 3D Volume Rendering Organ Separation

Two volume rendering techniques for separating organs are shown here. The grow region technique and the crop technique.

An organ that has a significant density difference such as the lung can be separated with the grow region. Select the Grow Region tool under the ROI menu. Select **3D** Growing Region in the dialog box so you are applying it to the whole series. Next to Algorithm select Threshold (interval) to select the simplest method. Click on the lung area and a transparent ROI selection will be made. Different points on the image and different threshold values can be selected to see varying results. Then click Compute on the dialog box to create an ROI for the whole series.

To include the vessel lumens click on the **ROI Menu** and select **Brush ROI Filter** and then **Closing**. Use 10 pixels in the radius value requested.

To remove all of the pixels not in the ROI go to the ROI Menu and select Set Pixel Values To. A parameters dialogue box will appear. Set all pixels outside the ROI to -1024. This will separate the lungs from the rest of the data.

A heart rendered in 3D Volume rendering can be separated from the surrounding tissue by using the crop technique. The green dots of the **Crop** tool represent each plane. The planes can be moved in and out to crop the object. Then the **Sculpt 3D Object** tool can be used to select and delete areas to be removed. A superior view is a good way to separate the anterior ribs from the heart.

Transparency can also be affected with the **Contrast** tool. Increase contrast to visualize bone and lower contrast to visualize soft tissue.

## Osirix<sub>as a</sub> resource

### **TOOLS YOU CAN USE**

Grow Region similar pixel densities added to pixel selected

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RO RO Set	Manager. Info Rename. Default R	 Ol Name		ж
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Gre	oup Selecti group Sele	eted ROIs		CHU UHJ
Set	Picel Valu	es te		
Gro	w Region	(20/30 Se	gmentation!	
and	an mot ris			
Cal	cium Scori	ing		









Osirix two surface renderings



Osirix one surface rendering

## Technique

### 3D Surface Rendering Separation

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.

A 3D surface model can be exported that is compatible with graphic modeling programs such as 3D Studio Max and Maya. The **Export 3D-SR** tool exports five file formats. They are Renderman, VRML, Inventor, Wavefront and STL.



### **TERMS YOU CAN USE**

Ray-trace simulates the effects of light shading, lighting, color and transparency

Renderman (.rib) RenderMan interface between rendering and modeling programs

VRML (.vrml) Virtual Reality Modeling Language represent 3D vector graphics

Inventor (.iv) code to display 3D objects

Wavefront (.obj) 3D object file

STL (.stl) representing solid models

### TOOLS YOU CAN USE



Dialogue Box 3D Surface define pixel value resolution and iterations



### **TOOLS YOU CAN USE**





**4D Player** Plays dynamic sequence



tissue intensity values

### TERMS YOU CAN USE

Dynamic Gated Cardiac continuous portrayal of the heart over time



4D movie from cardiac CT osirix-viewer.com/Snapshots.html

## Technique \_\_\_\_\_

### 2D and 3D Window Beating heart

**Dynamic Gated Cardiac** CT, MRI and PET images can be visualized in Osirix as a beating heart.

Select all of the image thumbnails in the Database window and click on the **4D** tool.

Once in the Viewer window select 3D Volume rendering in the 2D/3D tool.

4D movie from cardiac CT osirix-viewer.com/Snapshots.html

Customize the toolbar so the **4D Player** tool is in the toolbar. This 4D player tool has a **Play** button to activate the beating heart.



First Edition, 2007 Osman Rotb, Antoine Rosset, Joris Heuberger Printed in full color, 160 pages, 480 figures Includes DVD with 45 min Sutorial & software/data

## Resources

This tutorial was produced to improve the novice users understanding of Osirix as a resource.

Other resources that were used in creating this tutorial are listed in the sidebar to the right for your reference.

By providing terminology, navigation and techniques that pertain to the Biomedical Visualization user, I hope to promote the use of Osirix as a resource.



Wikipedia

http://en.wikibooks.org/ wiki/Online\_Osirix\_Docu mentation

Osirix the Pocket Guide osirix-viewer.com/Learn ing.html

Osirix tutorial - Apple, Inc. seminars.apple.com/ seminarsonline/osirixintro/ apple/index.html?s=300

Osirix Home Page osirix-viewer.com/index. html

Osirix Discussion Groups tech.groups.yahoo.com/ group/osirix/

### Help

Email Project Lead Go to Home Page OsiriX Discussion Group

User Manual Online Documentation

Help Menu in Osirix



### TERMS YOU CAN USE

3D window (p. 4) view and manipulate 3D data sets

Angiogram (p. 16) Static or dynamic. Used to visualize the lumen of vessels or organs. Contrast agent injected shows up on x-ray.

AVI (.avi) (p. 13) Audio Video Interleave. Audio & video data.

#### CT (p. 3) Computed Tomography

Image sections are created from a 2D Xray moving around a single axis. They form a 3D image of internal anatomy.

Database window (p. 4) import data sets (com+D) DICOM (p. 3) File extension – .dcm Digital Imaging and Communications in Medicine. The DICOM file standard is used in image and patient data from CT, MRI and PET medical imaging equipment.

Dynamic gated cardiac (p. 20) continuous portrayal of the heart over time

Inventor (.iv) (p. 19) code to display 3D objects

JPEG (.jpg) (p. 13) Joint Photographic Experts Group. Lossy compression. 12-bit jpeg for medical systems

### MIP (p. 9)

Maximum Intensity Projection high contrast for 3D object

MPEG (.mpg) (p. 13) Moving Picture Experts Group. Video & audio data. Compression formats.

MPR (p. 8) Multiplanar Reformatting slicing through data in a new way

MRI (p. 3) Magnetic Resonance Imaging Magnetic field is created around anatomical structures creating an image.

PACS (p. 5) Picture Archiving & Communication System Used to coordinate workflow of scans

PDF (.pdf) (p. 13) Portable Document Format Independent of software, hardware or OS. Text, fonts & images

### PET (p. 3) Positron Emission Tomography

3D image of metabolic activity is created using gamma rays that interact with a metabolically active molecule.

Quicktime (.mov) (p. 13) Video, media, sound text, animation, interactive

Ray-trace (p. 19) simulates the effects of light shading, lighting, color and transparency

Renderman (.rib) (p. 19) RenderMan interface between rendering and modeling programs

ROI (p. 17) Region Of Interest emphasized area on image

STL (.stl) (p. 19) representing solid models

TIFF (.tiff) (p. 13) Tagged Image File Format. Stores image data in tags. Lossless compression. Advanced pixel data types for scientific imaging.

Viewer window (p. 4) view and manipulate 2D data sets

VRML (.vrml) (p. 19) Virtual Reality Modeling Language represent 3D vector graphics

Wavefront (.obj) (p. 19) 3D object file

Index\_

This list of terms is offered to aid in your understanding of Osirix.

Page numbers are given for each term. Look for and information on the discussion topic. sidebars on the accompanying pages for terms



### TOOLS YOU CAN USE

2D-3D Viewer (p. 5) open viewer window

2D/3D (p. 8) open 3D window

2D MPR (p. 8) oblique planes across data

2D Curved MPR (p. 8) curved planes across data

2D Orthagonal MPR (p. 8) axial, coronal, sagittal planes

3D Endoscopy (p. 9) navigate through lumen

3D MIP (p. 9) Maximum Intensity Projection Contrast (vasculature)

3D panel (p. 7) data in 3D

3D Surface Rendering (p. 9) rendering volume for 3D programs

> 3D Volume Rendering (p. 9, 20) tissue intensity values

4D Player (p. 20) Plays dynamic sequence

4D Viewer (p. 5, 20) sync PET and CT scans

Albums & Sources (p. 5) create data sets

Angle of View (p. 10) camera position

Anonymize (p. 5) remove ID

Best rendering (p. 11) resolution

Bone removal (p. 10) removes bone

Browse (p. 7) Detail (p. 10) fine/course

Dialogue box 3D

define pixel value

DICOM file (p. 11, 15)

Surface (p. 19)

resolution and

export DICOM

Engine (p. 11)

Ray cast 3D texture

Export (p. 5, 14)

File menu - export

format selection

animated movie

Grow Region

(p. 17, 18)

Fly Thru (p. 11, 15)

similar pixel densities

added to pixel selected

export data

(p. 14)

iterations

Burn (p. 5, 14) burn cd

display cine

images

CD-Rom (p. 5) import from cd

> CLUT (p. 6, 10) Color Look Up Tables assign color

Contrast (p. 6, 10, 18) Adjustment contrast & intensity

Convolution filters (p. 16) Enhance image for further separation.

Crop volume (p. 11, 18) frame to crop

Database (p. 6) return to window iPod (p. 5, 14) export to iPod

> Import (p. 5) import data

> > Length (p. 6, 10) measure distance

Manipulate (p. 10) around center of gravity

Move and Pan (p. 6, 10) command key

Movie export (p. 7, 15) create a Ouicktime movie

Opacity (p. 10) preset opacities

Orientation (p. 7, 11) plane of reference

Patient (p. 6) previous/next Perspective (p. 11) advanced

Print (p. 7) print image

> Propagate (p. 7, 17) ROI to all images in stack

Rate (p. 7) speed of browse button

Rotate (p. 6, 10) horizontally move

Scroll (p. 6) through image set

Sculpt 3D object (p. 10, 18) scissors cut out

Shading (p. 11)

advanced

Series (p. 6) previous/next

Subtraction mask (p. 16) Separate dynamic portion of image from the rest.

Sync (p. 7) applies changes to all images

Tag reference points (p. 10) specific feature

Thick slab (p. 7) change slab thickness

Tile (p. 6) tile view

VR Movie export (p. 15) create interactive Quicktime movie

WL & WW (p. 6, 10) preset contrast and intensity

Zoom (p. 6, 10) shift key

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This list of tools is offered to aid in your understanding of Osirix.

Page numbers are given for each tool. Look for sidebars on the accompanying pages for

tools and information on the discussion topic.