

# 3D-DOCTOR

Web: [www.3d-doctor.com](http://www.3d-doctor.com)

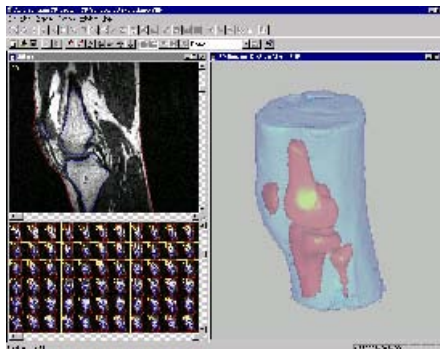
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## VECTOR-BASED 3D MODELING, IMAGING & MEASUREMENT

**3D-DOCTOR** is an advanced 3D modeling, image processing and measurement software for MRI, CT, PET, microscopy, scientific, and industrial imaging applications.

**3D-DOCTOR** supports both grayscale and color images stored in DICOM, TIFF, Interfile, GIF, JPEG, PNG, BMP, PGM, RAW or other image file formats. **3D-DOCTOR** creates 3D surface models and volume rendering from 2D cross-section images in real time on your PC.

You can export the mesh models to STL, DXF, IGES, 3DS, OBJ, VRML, XYZ and other formats for surgical planning, simulation, quantitative analysis and rapid prototyping applications. You can calculate 3D volume and make other 3D measurements for quantitative analysis. **3D-DOCTOR's** vector-based tools support easy image data handling, measurement, and analysis.



3D CT/MRI images can be re-sliced easily along an arbitrary axis. Multi-modality images can be registered to create image fusion. Misaligned slices can be automatically or semi-automatically aligned using **3D-DOCTOR's** image alignment functions. The 3DBasic scripting tool makes it easy to create Basic-like sophisticated 3D imaging programs. Get **3D-DOCTOR** today and visualize your images in 3D.

**3D-DOCTOR** is approved by FDA (US Food and Drug Administration 510K clearance) for medical imaging and 3D visualization applications. It has been named the **Top 3D Imaging Software** by *Scientific Computing & Instrumentation* Magazine in the Year 2002 and Year 2000 Annual Technology Leaders Issue. **3D-DOCTOR** is the winner of the 2004 Frost & Sullivan **Excellence in Research of the Year Award**.

**3D-DOCTOR** is currently being used by organizations around the world for medical, scientific, industrial and military 3D imaging applications, including MIT, Mass. General Hospital (MGH), Brigham Women's Hospital, Harvard Univ., Johns Hopkins Univ., Stanford Univ. Medical Center, Stanford Univ. Radiology, Carnegie Mellon Univ., SUNY Buffalo, US Army, Army Inst. of Surgical Research, US Navy, Volkswagen AG (Germany), Univ. of Pittsburgh, Research Council of Alberta (Canada), The Research Inst. of Molecular Pathology (Austria), Monash Univ. (Australia), Staten Island Univ. Hospital, ABB, General Mills, MicroVision (France), Eberhard-Karls-Universitat Tuebingen (Germany), AS&E, Minus 9 Technology (Canada), Kanazawa Institute of Technology (Japan), Univ. of Saskatchewan (Canada), Oakland Univ., Univ. Di Cantania (Italy), Kyung Hee Univ. (Korea), Univ. Di Catania (Italy), Staten Island Univ. Hospital, Univ. of Virginia, Univ. of Texas, MD Anderson Cancer Center, Memorial

*"3D-DOCTOR includes 3D image rendering, volume visualization, image processing and image analysis for CT, MRI, microscopy, ultrasound and industrial testing."* Advanced Imaging, June 1998

*"A 3D rendering is constructed from 2D image slices in a few seconds."* NASA Tech Briefs, August 1998

*"Improve Your Image: 3D-DOCTOR provides the tools needed to visualize 3D image and volumetric data stored in DICOM, TIFF, BMP and other formats."* NATURE MEDICINE, Sept. 1998

*"Able Software's customer support is excellent."*, Mr. J. MacKay, Office of Surface Mining Management, US Government

*Sloan-Kettering Cancer Center, Max-Planck-Institut (Germany), Knolls Atomic Power Lab., Univ. of Minnesota, Trial Practice, National Hospital of Norway, City Univ. of Hong Kong, TranScan Medical Systems (Israel), Singapore Defense Ministry, VA Medical Center (Boston), VA Medical Center (TN), The Univ. of Michigan, The Medical Univ. of South Carolina, InVision Tech., Clinical Education, Wayne State Univ., Boston Scientific, NASA Glenn Research Center, Loma Lida Univ., School of Dentistry, Institute of Cardiology of Montreal, Sunnybrook & Women's College Health Science, Ottawa Heart Institute, Xenogen Corp., Thomas Jefferson Univ. Hospital and many others.*

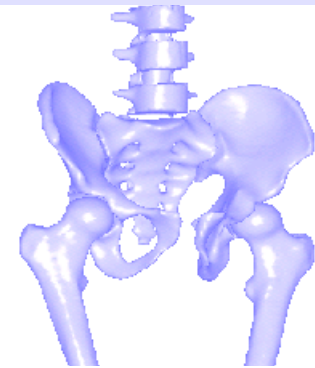
## 3D-DOCTOR CONVERTS CT/MRI IMAGES TO 3D MESH MODELS



Step 1. Original CT image



Step 2. Image Segmentation



Step 3. 3D mesh model created

## VECTOR-BASED TECHNOLOGIES

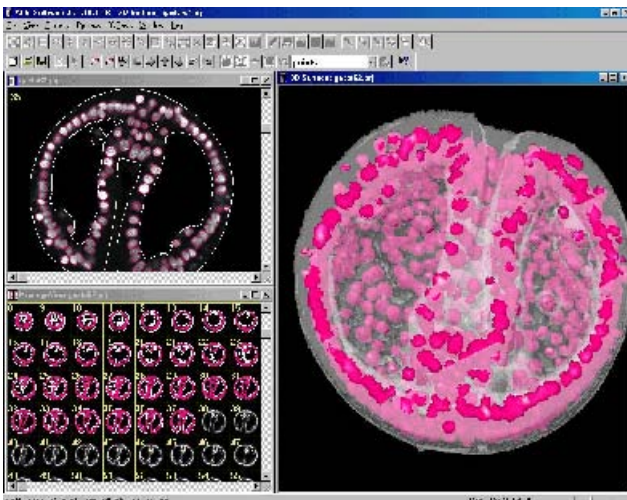
- **Input Image:** CT, MRI, PET and other cross-sectional images in DICOM, TIFF, BMP, JPEG, Interfile, PNG, PGM, GIF, Raw Image Data, and other uncompressed image formats. Image files in various vendor specific formats can be easily read using 3D-DOCTOR's universal image configuration and input function. Both grayscale (8-bit and 16-bit) and color images are supported. Scanned CT/MRI films can easily be cropped using the template-based function for 3D imaging applications.
- **3D Model Export:** STL, AutoCAD DXF, 3D Studio (3DS), IGES, VRML, Wavefront OBJ, raw triangles, and other 3D graphics file formats for rapid prototyping, 3D printing, animation and visualization applications. Once object boundaries are generated from segmentation, 3D mesh models are created in using one of the surface rendering functions. Unlimited number of objects representing different tissues are supported .
- **Segmentation Tools:** The fully automatic texture-based segmentation for grayscale and color images works with most images. The threshold-based Interactive Segmentation is perfect for processing CT images. The region-based Object Segmentation allows quick segmentation of local areas, such as a tumor. The easy-to-use polygon-based manual tracing method provides the flexibility of segmenting tissues with weak edges.
- **High Quality 3D Mesh Modeling:** From segmented boundary data, 3D surface mesh model is created quickly using one of the vector-based surface rendering commands. 3D models of multiple tissue objects are supported for realistic 3D display and quantitative analysis. No more long time waiting, 3D-DOCTOR lets you see your data in 3D quickly and easily. **3D Volume** is calculated accurately from the surface geometry using the surface rendered data.
- **3D Volume Rendering:** 3D volume can be rendered in either color or grayscale. Voxels are treated either as transparent or opaque.
- **Measurement and Quantitative Analysis:** Easily measure area, surface area, volume, distance, angle, profile and image region histogram. Detailed report for quantitative analysis of tissue areas and volumes.
- **3D Image Registration, Image Slice Alignment and Fusion:** Easily register two images that are related by specifying 4 or more control points in 3D-DOCTOR. Once a pair of images are registered, you can create an image fusion by combining the two images in all different methods supported, including add (+), subtract (-), And, OR, XOR, transparent, Max, Min and etc. You can fuse a CT image and MRI image from the same patient using the registration and fusion functions. The fusion image shows information that is hard to see in their original form.
- **Computed Tomography Reconstruction:** Create parallel cross-section, volume images using x-ray images taken at angles around an object. Turn your x-ray machine into a CT system using 3D-DOCTOR.

## 3D-DOCTOR IS FDA-APPROVED FOR MEDICAL IMAGING

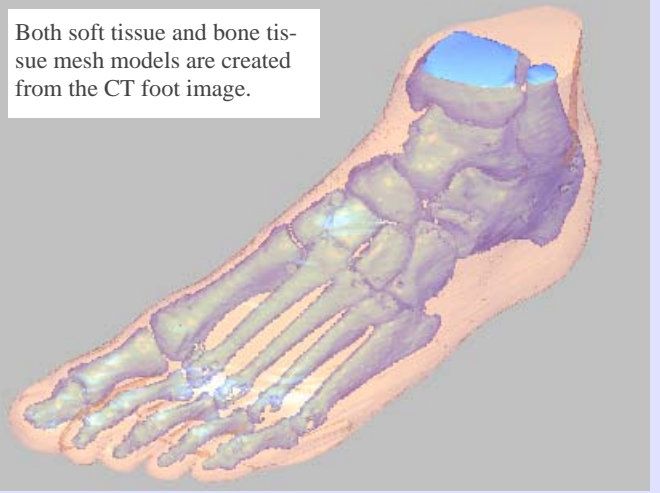
- **Image Processing:** image rotation, reslicing, contrast adjustment, background removal, edge detection, image smoothing, image sharpening, scanned film cropping, 3D image cropping, image combination, linear feature extraction, pattern recognition, segmentation, color classification. 3D volume image can be rotated around either the X axis or Y axis to create side view or top view image.
- **3DBasic** scripting language lets you create your own Basic-like sophisticated programs using 3D-Doctor's advanced imaging and rendering functions quickly. 3DBasic uses BASIC syntax so can you easily customize your own 3D imaging applications and automate frequently used processes.

### 3D MICROSCOPY IMAGING

- Supports 2D and 3D microscopy images in TIFF, BMP, JPEG, PNG, DICOM or raw file formats.
  - Easy to use segmentation to create object boundaries automatically and get statistical report quickly.
  - Handles multiple object and complete 3D display functions for volume and surface rendering.
  - Export 3D data to DXF, 3DS, STL, IGES, VRML and other formats
  - Measurements: 3D volume, surface area, 2D area, length and complete object report.
  - Automatic Image Slice Alignment
  - In-focus image fusion creates a fully focused image from a series of images at different focus.
  - Color image fusion combines 3 greyscale images into a 24-bit RGB image.
- \* The 3D image is courtesy of G. Martins and Dr. W.J. Sigurdson, Director, Confocal Microscope and 3-D Imaging Facility SUNY at Buffalo.



Both soft tissue and bone tissue mesh models are created from the CT foot image.



### 3D VISUALIZATION AND MEASUREMENTS OF CT/MRI IMAGES

- Open CT/MRI images in DICOM format or scan the film images into 3D-DOCTOR for processing.
- You can segment object boundaries for surface modeling and volume calculations.
- 3D-DOCTOR has many functions to measure length, area, 3D volume and surface area of objects and defined regions.
- You can use the 3D volume calculation to accurately evaluate a treatment or development.

### SURGICAL SIMULATION AND TREATMENT PLANNING

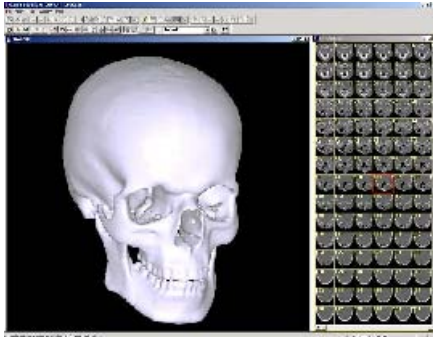
- You can create 3D models from CT/MRI images for surgical planning, surgical simulation, reconstruction, rapid prototyping and many other applications.
- The 3D models can be exported to AutoCAD DXF, IGES, STL for rapid prototyping, 3DS for 3D animation.

### MINIMUM SYSTEM REQUIREMENTS:

Windows 9X/NT/2000/XP or later. Pentium CPU or better, 256 MB or more recommended for 3D rendering of large images, 5 MB hard disk space for the software and extra space to store your images.

## GET 3D-DOCTOR TODAY FOR YOUR 3D IMAGING APPLICATIONS

### 3D MODELING AND RAPID PROTOTYPING



3D solid and surface models can be created from any types of volumetric images for modeling and rapid prototyping applications.

The 3D models can be exported to AutoCAD DXF, IGES,

STL for rapid prototyping, OBJ and 3DS for 3D animation.



This example shows a skull model printed using a 3D printer from the STL file generated by 3D-DOCTOR.

### REGISTRATION AND FUSION OF 3D IMAGES

- 3D-DOCTOR lets you register multi-modality images or images from different series so you can fuse them and make accurate comparison and analysis.
- Simply define 4 control points, you can register CT to MRI, PET to MRI and any 3D images.
- You can fuse your images using color fusion or mathematical fusion to combine the images.

### MEDICAL ILLUSTRATION

- 3D-DOCTOR provides a complete set of volume rendering and surface rendering functions so you can choose the best 3D display to show the anatomy and 3D structure of your data.
- You can easily print out the images, export the data to other programs and even create movies for your reports and publications.

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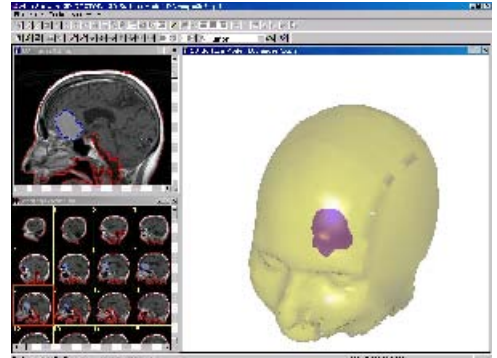
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www.directdimensions.com



### 3D MODELING & VOLUME MEASUREMENT USING MRI

Magnetic resonance imaging (MRI) produces high quality images of the human body.

A 3D mesh model can be created from a MRI image in 3 main steps:



- 1 Open the MRI image.
- 2 Image segmentation to generate object boundaries. This can be done using either the "Automatic Segmentation" or the region-based semi-automatic "Segment Object" command. Threshold-based segmentation method is normally not effective for MRI image. For small size soft tissues, the manual tracing method can be used as well. Boundaries can be edited using the boundary editor.
- 3 Creating mesh models using the surface rendering command. The models can be used for volume calculation, rapid prototyping, simulation or treatment planning applications.

#### **About Able Software Corp.**

Able Software Corp. is a leading software developer for 3D image processing, volume visualization and rendering applications since 1993. Able Software's software products are currently being used in more than 60 countries for medical imaging, GIS, mapping and CAD applications.

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