THE WOLFRAM SOLUTION FOR MEDICAL IMAGE PROCESSING

Humans are visual machines: a quarter of our brain is used for vision. Mathematica has superb and appealing graphics, everything is visual and interactive. It is an unsurpassed medium for the design stage of new methodologies. The completeness is just mind-blowing.

—Bart M. ter Haar Romeny
Professor, Department of Biomedical Engineering
Eindhoven University of Technology
Use built-in functions for segmentation, registration, restoration, and analysis of 2D and 3D volumetric images; prototype new algorithms quickly and efficiently; and deploy tools as standalone or web-based applications—from one system.

The Wolfram medical imaging solution provides a complete integrated workflow for image processing and application development, with the speed and performance benefits of GPU computation, parallel processing, and out-of-core technology.

THE WOLFRAM EDGE

- Design software programs to do edge-preserving smoothing, denoising, sharpening, and other enhancements
- Visualize tomography data in 2D or 3D such as CT and MRI scans
- Slice through 3D data and explore the inside of a volume
- Create pattern-recognition algorithms for computer-aided diagnosis or tumor detection
- Compare imaging measurements with biological models
- Capture and process images from imaging devices in real time
- Develop and simulate radio-frequency pulse sequences
- Process and analyze biometric input such as fingerprints, iris patterns, face and ear images, retinal scans, and more
- Analyze fiber orientation in lab-grown tissue to determine its strength
- Use noninvasive techniques to study the heart, reducing risk to the patient

KEY CAPABILITIES

- State-of-the-art linear and nonlinear image processing filters for smoothing, sharpening, removing noise, and more
- Variety of image segmentation algorithms for identifying regions of interest, along with functions for postprocessing and analyzing components
- Morphological transforms such as finding skeletons, distance transforms, and branch points
- Immediate detection or extraction of features such as edges, corners, and general keypoints for registering and comparing images
- Support for GPU computation with CUDA or OpenCL, including built-in functions for pixel operations, morphological operators, and image convolution and filtering
- Efficient implementations of image processing algorithms for 3D images or datasets
- Built-in 3D volumetric rendering engine
- Import and export hundreds of formats, including scientific and medical data files such as DICOM, FITS, HDF, and more
- Easily build interactive interfaces to instantly search the parameter space and visualize the results
- Out-of-core technology for scaling up performance to very large 2D and 3D volumetric images

FOR MORE INFORMATION

www.wolfram.com/medical-image-processing
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- Smoothing an ultrasound image to segment an angiomyolipoma (kidney tumor).
- Combining image analysis and other capabilities: an image of trabecular bone, its colorized watershed transform, and a histogram of the area of each basin.
- Rendering and analyzing 3D volumes.

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"Using the Manipulate command, I can adjust the curve to fit theoretical situations and try many different experiments quickly. It just adds precision and accuracy to what we're doing."

—Tim Shine
Anesthesiologist, Mayo Clinic

"Mathematica allows easy integration and evaluation of different kinds of imaging algorithms."

—Richard Scott
CDx Laboratories

"The abilities it's given me for building real-time models and analysis have been astonishingly helpful... I like to use Mathematica for composing ideas, showing those ideas, and keeping track of ideas."

—Donald Barnhart
Lead Developer and Chief Optical Scientist, Optica Software-iCyt
ORGANIZATIONS USING WOLFRAM TECHNOLOGY

Many of the world’s top companies and organizations rely on Wolfram products to maintain their competitive edge, including 100% of the Fortune 50 companies. Here are just a few:

- Canon
- Fujifilm
- IBM
- Los Alamos National Laboratory
- Mayo Clinic
- Microsoft
- Philips Research
- Eindhoven University of Technology

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Visit our medical image processing page for a free trial and explore how Wolfram technologies can further advance your work.

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