

Analyze 7.0: New Features and Enhancements

New Modules and Optional Add-Ons

DICOM Tool - A New DICOM Image Management Module

DICOM Tool is a completely new functionality for the import and management of DICOM images. DICOM Tool replaces the current BIRPacs functionality, including the Analyze client, the database, and the DICOM receiver. The client includes a much-improved interface to data selection and loading, including an image viewer for examining the images prior loading. The underlying database is new, providing much improved cross-platform compatibility, and new tools allow direct management of the receiver component directly from the client interface on all platforms. Information for migrating existing BIRPacs databases and stored images is also provided. DICOM Tool is not an optional add-on, and is directly integrated into and immediately accessible from Analyze 7.0.

MRI Diffusion Tensor Imaging (DTI) Add-On

The Diffusion Tensor Imaging (DTI) Add-On computes and saves the primary diffusion maps from diffusion-encoded MRI data. Seven datasets are imported including the baseline volume and six gradient encoded volumes. The diffusion tensor is estimated from these volumes and standard diffusion maps are generated including: apparent diffusion coefficient (ADC), relative anisotropy (RA), fractional anisotropy (FA), and volume ratio (VR) maps. In addition, a color-encoded volume is generated to display direction of the principal diffusion vectors at each voxel.

Volume Metrics Add-On: Image Similarity Metric Computation

The VolumeMetrics Add-On provides sophisticated tools to assess the quality of multiple associated volume images, including those derived from image registration and segmentation techniques. This Add-On allows the user to:

- assess the similarity of two co-registered three dimensional volumes with/without ROI using parametric (15 measures) and non-parametric (12 measures) similarity indices.
- compute directional change detection between two volumetric images using a fast and robust change detection technique.
- assess the concordance of different segmentation results with ground truth using 47 popular binary similarity metrics.
- to quantitatively assess the inter- and intra-rater agreement of multiple segmentations.
- compute statistical shape atlases from multiple segmentations.

MR T2 Projection Add-On: Predictive T2-weighted MR image generation

The MR T2 Projection Add-On optimizes the display of T2 contrast in MR images using a simple, fast, robust, three-dimensional and prior-information-driven technique by rapidly projecting T2 weighted MR Images across (TR, TE) space. The projections may serve as a preprocessing step to improve the quality of further image analysis and visualization with T2 MRI images.

Mayo 3D Brain Atlas Add-On

The Mayo 3D Brain Atlas Add-On provides a unique integration of the new Mayo 3D anatomical atlas of the human brain and the Analyze biomedical imaging software system for the purpose of using the defined anatomical components in the brain within Analyze modules. The Mayo 3D Brain Atlas provides four key steps in integration of the brain atlas:

1. Interactive AC-PC based alignment of volume image data to the Talairach-Tournoux coordinate and proportional

grid system.

2. Interactive scaling of the proportional grids to improve the spatial registration of the 3D Mayo Brain Atlas with the volume image data.
 3. Single or multiple point query of Talairach/volume coordinates to identify the nearest Talairach label to the queried point.
 4. Output of atlas-derived anatomical component maps for use with other Analyze modules.
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General Enhancements

Enhanced implementation of Object Maps

- Support for 4-D Object Maps

Parametric volume visualization

- Parametric information encoded from additional related volume
- Integrated with 2D and 3D displays
- 2D parametric map overlays
- 3D parametric map rendering (integrated with other object map controls)

Enhanced colormap definition for color tool

- Simple mechanism to establish colors for ranges of values, i.e., set 0-10 to be red, 11-50 to green, 51-100 to blue, etc.
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Module Specific Enhancements

File Management Modules

New image file format support

- Siemens/CTI MicroPET/MicroCAT format
- NIFTY neurofunctional image file format

Load As Module

- Added slider to Interactive Subregion tool to set beginning and ending slices.

Volume Render

- New tissue map control interface for volumetric compositing
- Advanced thresholding techniques for both global threshold determination and multilevel thresholding (presets)
- Added interactive orthogonal section display to Ortho Sections tool rendering

Spatial Filters

- Added distance transforms - chamfer, Euclidean, etc.

Watershed Segmentation

- T2-weighted MRI preprocessing for brain segmentation

Object Extractor

- T2-weighted MRI preprocessing for brain segmentation

Voxel Registration / Surface Matching Registration

- Added user-selected landmark correspondence registration to manual mode

Point-to-Surface Registration

- Integrated piecewise point-to-surface registration
- User-defined association of points to corresponding base objects
- Output of multiple transformation matrices

Region Of Interest

- Added area and volume measurements (uncalibrated and calibrated) for threshold ranges - Above, Between, Below thresholds
- Added 'Entropy Measures' for single volume analysis

Object Counter

- Extended to allow 3D object counting
- 3D objects segmented by size (connectivity) and shape (sphericity, etc.)

Software Structure / Distribution Enhancements

Analyze Software Structure Changes

- Upgraded to latest release of Tcl/Tk 8.4.11
- Upgraded to latest release of ITK

New platform support

- Itanium II 64-bit version (PC_LINUX64)

Integrated Analyze distribution assistance

- Automated Patch Update Tool
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