

The BioImage Suite Module Description Manual

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Contents

1. Understanding the Module Framework	1
1.1. Summary	1
1.2. Module Architecture Summary	1
2. Catalog	6
3. Image Processing	12
3.1. Cast Image (bis_castimage)	12
3.2. Cluster Threshold (bis_clusterthresholdimage)	13
3.3. Convolve Image (bis_convolveimage)	15
3.4. Crop Image (bis_cropimage)	17
3.5. C-Blank Image (bis_cylindricalcropimage)	19
3.6. Signed DistanceMap (bis_distancemapimage)	21
3.7. Edge Detection (bis_edgedetectimage)	22
3.8. Fourier Transform (bis_fftimage)	24
3.9. Flip Image (bis_flipimage)	25
3.10. Dilate/Erode Filter (bis_imagedilate)	27
3.11. Median Filter (bis_imagemedian)	28
3.12. Threshold By List (bis_listthresholdimage)	30
3.13. Log Image (bis_logimage)	32
3.14. ReOrient Image (bis_newreorientimage)	33
3.15. Anisotropic Diffusion (bis_nonlinearsmoothimage)	35
3.16. PiecewiseMap (bis_piecewiseimagemap)	36
3.17. Proportional Scale Image (bis_proportionalscale)	39
3.18. Regularize Objectmap (bis_regularizeobjectmap)	41
3.19. Relabel Header (bis_relabelimage)	42
3.20. Reorient Image (bis_reorientimage)	44
3.21. Resample Image (bis_resampleimage)	45
3.22. Inv Fourier Xform (bis_rfftimage)	47
3.23. Shift/Scale Image (bis_shiftscaleimage)	49
3.24. Smooth Image (bis_smoothimage)	50
3.25. Threshold Image (bis_thresholdimage)	52
4. Image Processing-4D	54
4.1. Combine Frames (bis_combineframes)	54
4.2. Exponentia Fit Image (bis_exponentialfitimage)	55
4.3. Remove Frames (bis_imageremoveframes)	57

4.4. Interleave Frames (bis_interleave)	59
4.5. Median Temporal Smooth (bis_mediantemporalsmoothimage)	60
4.6. 4D Preprocess Image (bis_preprocessimage)	62
4.7. Remove Slice Mean (bis_removeslicemean)	64
4.8. Temporal Drift Removal (bis_remove temporaldrift)	65
4.9. Temporal Smooth (bis_temporalsmoothimage)	67
5. Image Processing Dual	69
5.1. Bias Field (bis_biasfield)	69
5.2. Image Blend (bis_blendimage)	71
5.3. CheckerBoard (bis_checkerboardimage)	72
5.4. Color Blend Image (bis_colorblendimage)	74
5.5. Create Image Overlay (bis_createoverlayimage)	76
5.6. CSF WM Motion Correction (bis_csfwm motioncorr)	78
5.7. Compute FDR (bis_fdr)	80
5.8. Compute Image Comparison (bis_imagecompare)	81
5.9. Math Operations (bis_imagemathoperations)	83
5.10. Manual Reslice (bis_manualreslice)	85
5.11. Mask Image (bis_maskimage)	86
5.12. Image Reslice (bis_resliceimage)	88
5.13. ROI Mean (bis_roimean)	90
5.14. Math Operations (bis_singleimagemathoperations)	91
5.15. Slice Inhomogeneity (bis_sliceinhomogeneity)	93
5.16. Stitch images (bis_stitchimage)	95
5.17. Compute T-Test (bis_ttest)	96
6. Image Processing Multiple	99
6.1. Combine Set of Images (bis_combineimages)	99
6.2. Concatenate Set of 3D Images (bis_create4dimage)	100
7. Surface Processing	103
7.1. Clean Surface (bis_cleansurface)	103
7.2. Clip Surface (bis_clipsurface)	104
7.3. Compute Normals (bis_computenormals)	106
7.4. Connect (bis_connect)	107
7.5. Curvatures (bis_curvatures)	109
7.6. Decimate (bis_decimate)	111
7.7. Delaunay Triangulation (bis_delaunay3D)	112
7.8. Extract Objectmap (bis_extractobjectmap)	114
7.9. Extract Surface (bis_extractsurface)	115
7.10. Smooth Surface (bis_smoothsurface)	117
7.11. Subdivide (bis_subdivide)	119
7.12. Threshold points (bis_thresholdpoints)	120
7.13. Transform Surface (bis_transformsurface)	122
7.14. Triangulate (bis_triangulate)	123
8. Registration	125
8.1. Combine Transformations (bis_combinettransformations)	125

8.2. Compute Displacement Field (bis_computedisplacementfield)	127
8.3. Compute Overlap (bis_computeoverlap)	128
8.4. Compute Similarity (bis_computesimilarity)	130
8.5. Linear Registration (bis_linearintensityregister)	132
8.6. Linear RPM (bis_linearpointregister)	134
8.7. Manual Registration (bis_manualregistration)	136
8.8. Distortion Cor (bis_nonlineardistortioncorrection)	138
8.9. NonLinear Reg (bis_nonlinearintensityregister)	140
8.10. NonLinear RPM (bis_nonlinearpointregister)	143
8.11. Serial Demons Mouse Registration (bis_serialdemonmousereg)	145
8.12. Compute Jacobian (bis_singlejacobian)	146
8.13. Visualize Transformation (bis_visualizetransformation)	148
9. Segmentation	151
9.1. Intensity Segmentation (bis_intsegment)	151
9.2. Tissue Levelset (bis_levelset)	153
9.3. Strip Skull (bis_stripskull)	155
10.Functional Imaging	159
10.1. Compute Correlations (bis_computecorrelations)	159
10.2. Compute GLM Regression (bis_computeglm)	161
10.3. Matrix Correlation (bis_matrixcorrelation)	162
10.4. MultiSubject fMRI (bis_multisubjectfmri)	164
10.5. R-value to 1-p value (bis_rtopvalue)	165
10.6. R-value to T-Score (bis_rtotmap)	167
10.7. Seed Correlation (bis_seedcorrelation)	168
10.8. MultiSubject fMRI (bis_singlesubjectfmri)	170
10.9. T-score to P-value (bis_tmaptopvalue)	172
10.10T-score to Z-score (bis_tmaptozscore)	173
10.11Zmap to pvalue (bis_zscoretopvalue)	175
11.DiffSPECT	177
11.1. ISAS (bis_ISAS)	177
11.2. Diff SPECT with ISASHN (bis_ISASHN)	179
11.3. Calculate RF (bis_spectrf)	181
12.Diffusion Tensor	183
12.1. Compute Tensor (bis_computetensor)	183
12.2. Tensor Reslice (bis_reslicetensor)	185
12.3. Compute DTI Maps (bis_tensoranalysis)	187
13.Vascular Imaging	189
13.1. Frangi Vesselness (bis_frangivesselness)	189
13.2. Qian Vesselness (bis_qianvesselness)	191
14.Landmarks Processing	194
14.1. Resample Landmarks (bis_resamplelandmarks)	194
14.2. Smooth Landmarks (bis_smoothlandmarks)	195

15. Utility	198
15.1. DICOM 2 NIFTI (bis_dicom2nifti)	198
15.2. Image Info (bis_headerinfo)	199
15.3. Make Batch (bis_makebatch)	201
15.4. Split 4D Image (bis_split4dimage)	202
15.5. Surface Info (bis_surfaceinfo)	204
A. Alphabetical Algorithm List	206

Chapter 1

Understanding the Module Framework

1.1 Summary

Most algorithmic functionality in BioImage Suite 3.0 can be accessed either from the command line or as modules in larger applications. This manual describes all modules that are accessible in this way.

A module directly in two ways:

1. Command line scripts – e.g. by calling `bis.smoothimage` in the case of image smoothing.
2. Standalone applets with a graphical user interface – e.g. by calling `bis.smoothimage --dogui 1` in the case of image smoothing.

1.2 Module Architecture Summary

Image analysis algorithms are typically developed to address a particular problem within a specific domain (functional MRI, cardiac, image-guided intervention planning and monitoring, etc.). Many of these algorithms are rapidly prototyped and developed without considerations for a interface (GUI), robust testing, and integration into a large software package. Sometime these features are added later, but require considerable amount of effort on the part of the developer of the original algorithm. This makes it increasingly difficult for deployment and widespread adoption of the newly developed algorithms on multiple platforms which requires robust testing and easy-to-use interfaces are critical.

BioImage Suite [Papademetris et al. '06] is a comprehensive, multi-platform image analysis suite comprised of many different image analysis algorithms with a focus on epilepsy neurosurgery. In previous versions of BioImage Suite (up to version 2.6 released in November 2008), all algorithms

were implemented in C++ and invoked from either command line scripts or GUI modules both written in the Tcl scripting language. However, the command line scripts and GUI modules were two separate implementations of essentially the same algorithm and would invariably diverge without extensive coordination. This required developers to create both command line scripts as well as complex GUIs. Testing became problematic as two new applications need to be tested for each new algorithm. Finally as new algorithms became more complex, basic components (e.g., image smoothing) were often reimplemented instead of using existing implementations of these components.

To address the issues discussed above, we developed a framework that unifies the algorithm that is being invoked from the command line as well as from the user interface. We have chosen a component-based software approach which has been widely used and researched in the field of software engineering. In our framework, a component performs an operation (smoothing, surface extraction and so on) on the specified input data (images, surfaces, transformations). The main algorithm is developed in C++ while its functionality is encapsulated into an [Incr Tcl] object. [Incr] Tcl is one of the most commonly used object-oriented extension for Tcl, which is not an inherently object oriented language. The encapsulation of C++ classes allows the user to instantiate an object in a tcl script and handle the input/output as well as the GUI via inherited methods.

With this framework, the developer can focus on the creation of the algorithmic component and not worry about software engineering aspects such as testing, integration, and creating customized workflows. The GUI is automatically generated by the algorithm object when the object is invoked – however, given that this is an object-oriented framework, the developer may customize this by overriding the appropriate methods. Testing is handled by the algorithm object by specifying the inputs, expected outputs, and the test flag. Additionally, in this new framework, it is possible to create data workflows where the output of an algorithm can then be used as the input of another algorithm. Thus, developers can reuse existing algorithms saving time and reducing programing complexities.

In addition this framework, with its central definition of parameter handling code, enables BioImage Suite components to output descriptions for both the Slicer Execution Interface and the LONI Pipeline at no extra work to the developer – this is handled by the abstract parent class of the component hierarchy.

```
[alark1@node1 bis_algorithm]$ bis_smoothimage.tcl
----- BioImage Suite Command Line Tools (www.bioimagesuite.org)-----

[NAME]
bis_smoothimage.tcl Smooths an image with a specific gaussian kernel.

[SYNOPSIS]
bis_smoothimage.tcl [--inp ] [--out ] [--blursigma ] [--unit ] [--radius ] [--dimension ] [--dogui ] [--pset ] [--slicemode ] [--ctest ] [--loni ]

[DESCRIPTION]
Smooths an image with a specific gaussian kernel. Smoothing kernel size blursigma (in mm by default ) represents the FWHM filter size.

[Inputs]
input_image (command line option --inp) : Input Image

[Outputs]
output_image (command line option --out) : Output Image

[Options]
blursigma : kernel size [mm/voxel] of FWHM filter size. Default value is "2.0". Allowed range is from 0.0 to 20.0
unit : Kernel size unit mm or voxels . Default value is "mm". Allowed values = [ mm, voxels ]
radius : radius factor of the gaussian in voxel units . Default value is "1.5". Allowed range is from 0.0 to 5.0
dimension : 2 or 3 to do smoothing in 2D or 3D. Default value is "3". Allowed values = [ 2, 3 ]
dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
pset : Use Parameter set to set parameters. Default value is "". Allowed values are either 0 (Off) or 1 (On)
slicemode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
ctest : Enable the running of ctest automated testing. Default value is "0".
loni : Create xml output for loni pipeline and exit!. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[BACKWARD COMPATIBILITY]
Reimplemented from pnat_smoothimage.tcl. unit and radius options are added. Multiple image processing eliminated, which will be recovered upon request.

[NOTE]
BioImage Suite accepts both single dash and double dash specs, e.g. you may use --dogui instead of -dogui or vice-versa.
[alark1@node1 bis_algorithm]$
```

Figure 1.1: Command line invocation of a script without any parameters gives you information about the input parameters that the script takes and how they can be invoked.

```
[alark1@node1 bis_algorithm]$ bis_smoothimage.tcl -dogui 0 --inp MNI_T1_1mm.nii.gz --blursigma 2.0 -radius 4.2
Saved object Output Image in /mnt/cluster1/alark/vtk5_src/bioimagesuite/bis_algorithm/MNI_T1_1mm_sm.nii.gz
```

Figure 1.2: Command line invocation of the *bis_smoothimage* script with the *-dogui* set to 0. The script runs based on the input parameters selected and saves the output.

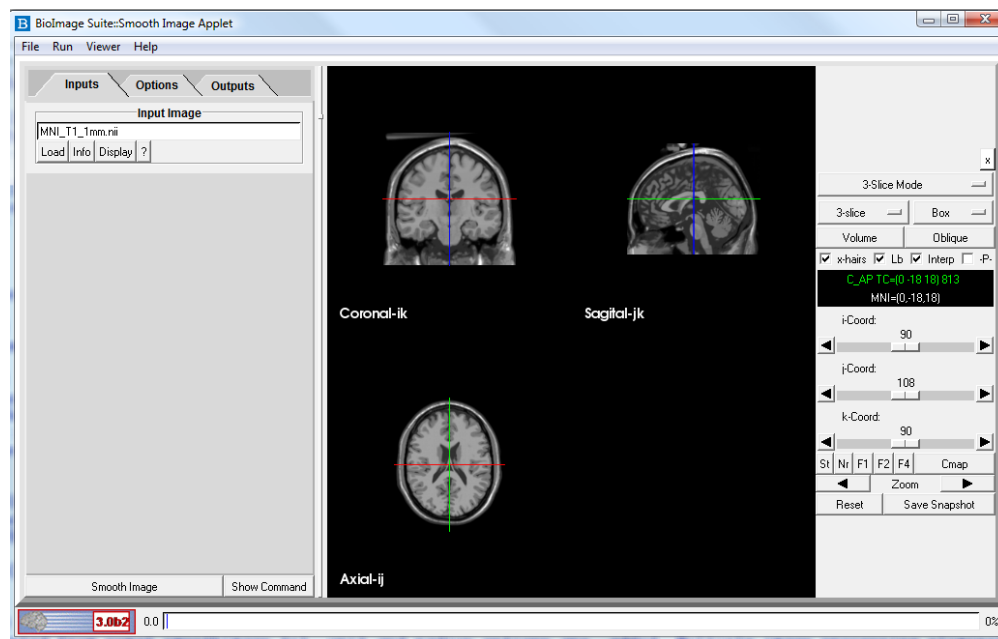


Figure 1.3: Using this framework, the GUI functionality can be invoked for any script by simply setting the *-dogui* set to 1. Alternatively, the script can be simply invoked as *bis_smoothimage.tcl -dogui 1* and then the rest of the parameters can be selected using the user interface.

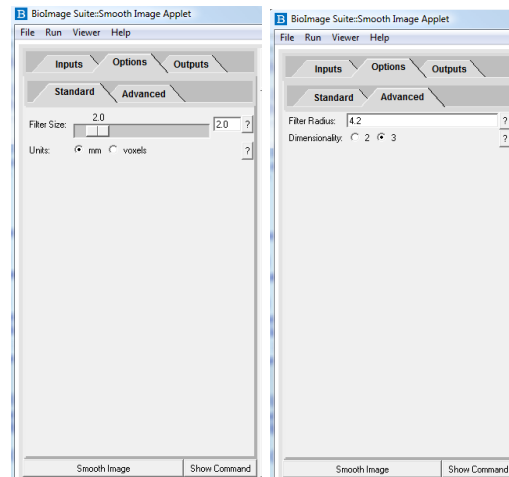


Figure 1.4: Under the Options tab, you can set the input parameters before running the algorithm.

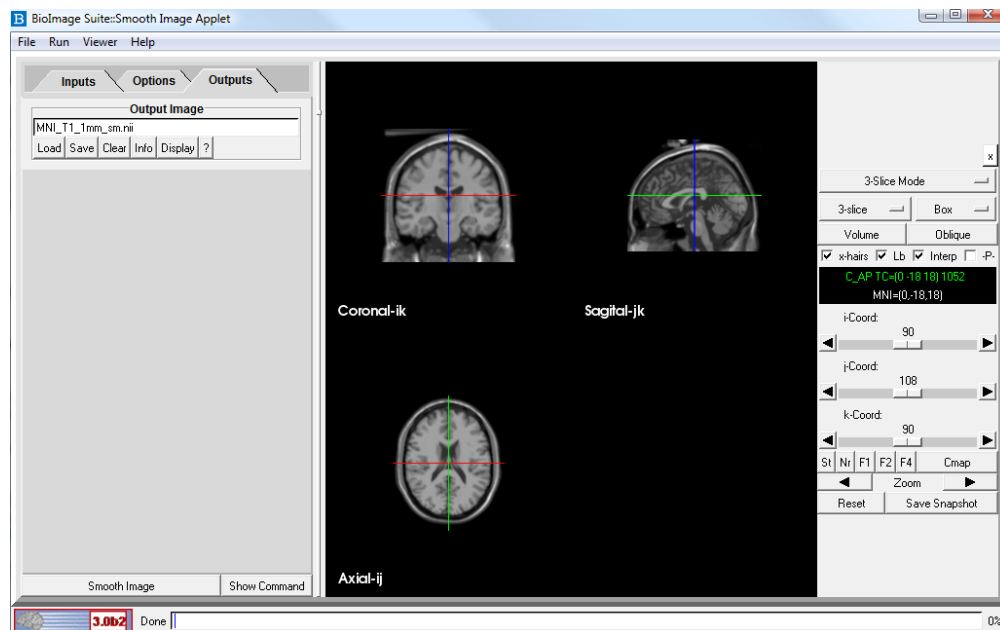


Figure 1.5: The output tab allows the user to save the output image (or surface depending on the algorithm) and automatically updates the viewer with the result of the algorithm - here the smoothed image is shown in the viewer.

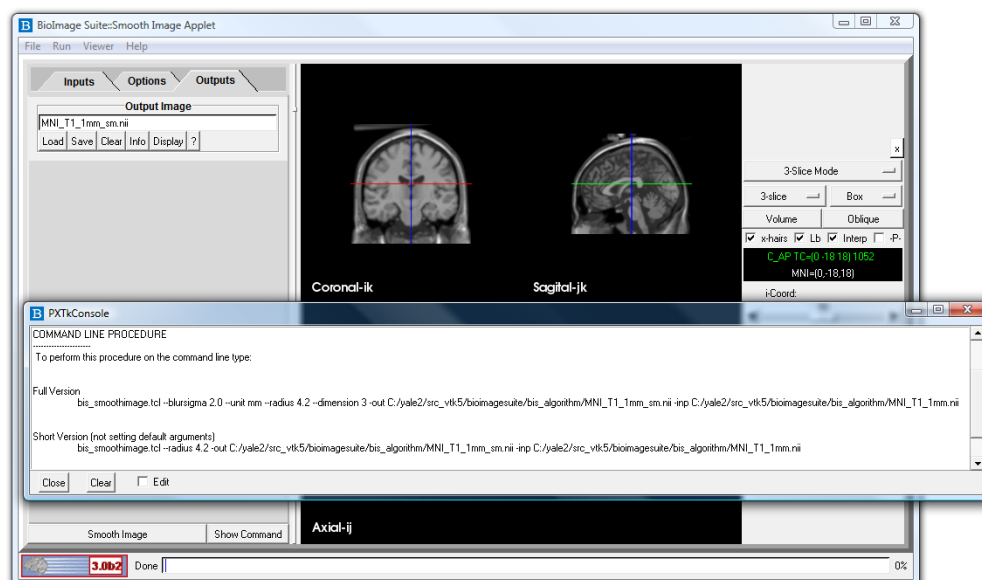


Figure 1.6: The 'Show Command' button can be used to show the actual command that one can use to run the script with those parameters on the command line.

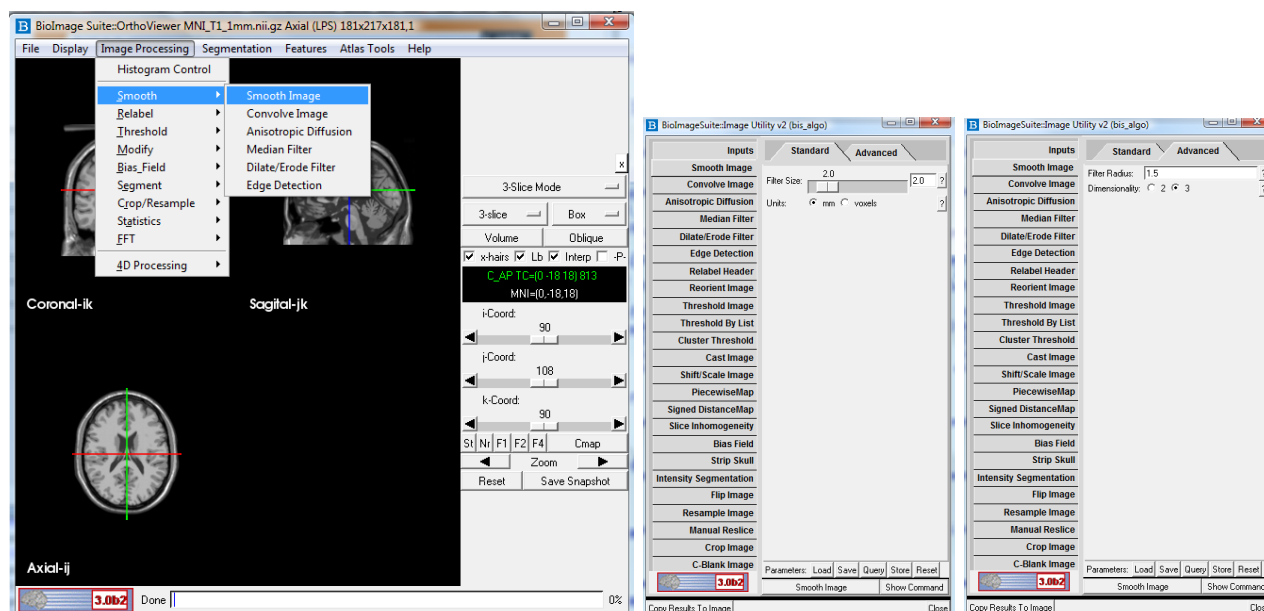


Figure 1.7: These algorithms can also be invoked from the main BioImage Suite application such as shown here. The code invoked though is still the same code and ensures consistency regardless of which way the algorithm is invoked (command line, graphics user interface, from within a bigger application).

Chapter 2

Catalog

Note: The manual pages for each module are automatically generated from the BioImage Suite source code.

Image Processing

1. Cast Image (`bis_castimage`) cast (or convert) image data type. – See Section 3.1 (on page 12)
2. Cluster Threshold (`bis_clusterthresholdimage`) thresholds an image to generate a binary output using a specific threshold and clusters to a certain voxel size. – See Section 3.2 (on page 13)
3. Convolve Image (`bis_convolveimage`) Convolves an image with a specific gaussian/gaussian derivative/hessian kernel. – See Section 3.3 (on page 15)
4. Crop Image (`bis_cropimage`) Crops an image with a specific cropping window/radius. – See Section 3.4 (on page 17)
5. C-Blank Image (`bis_cylindricalcropimage`) Blanks an image with a specific cylinder. – See Section 3.5 (on page 19)
6. Signed DistanceMap (`bis_distancemapimage`) Create a distance map from a binarized image – See Section 3.6 (on page 21)
7. Edge Detection (`bis_edgedetectimage`) Computes an edge map for an image following smoothing – See Section 3.7 (on page 22)
8. Fourier Transform (`bis_fftimage`) computes the fourier transformation of an image. – See Section 3.8 (on page 24)
9. Flip Image (`bis_flipimage`) flips image about one of the coordinate axes. – See Section 3.9 (on page 25)
10. Dilate/Erode Filter (`bis_imagedilate`) Modifies an image using continuous dilation filtering – See Section 3.10 (on page 27)
11. Median Filter (`bis_imagemedian`) Smooths an image using median filtering – See Section 3.11 (on page 28)
12. Threshold By List (`bis_listthresholdimage`) thresholds an image to generate a binary output using a specific threshold. – See Section 3.12 (on page 30)
13. Log Image (`bis_logimage`) computes linear intensity transformation – See Section 3.13 (on page 32)

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14. ReOrient Image (bis_newreorientimage) newreorients an image to a given orientation. – See Section 3.14 (on page 33)
 15. Anisotropic Diffusion (bis_nonlinearsmoothimage) Smooths an image using anisotropic diffusion filtering – See Section 3.15 (on page 35)
 16. PiecewiseMap (bis_piecewiseimagemap) Performs piecewise mapping of an image using a linear spline with prescribed knots. – See Section 3.16 (on page 36)
 17. Proportional Scale Image (bis_proportionalscale) Proportional scales input images to the mean specified in the options. – See Section 3.17 (on page 39)
 18. Regularize Objectmap (bis_regularizeobjectmap) Regularizes an objectmap (an image where each value represents an object) to smooth manual segmentations – See Section 3.18 (on page 41)
 19. Relabel Header (bis_relabelimage) relabels an image to a given orientation. Output orientation is 0=axial, 1=coronal, or 2=sagittal. – See Section 3.19 (on page 42)
 20. Reorient Image (bis_reorientimage) reorients an image to a given orientation. – See Section 3.20 (on page 44)
 21. Resample Image (bis_resampleimage) Resamples an image to a specific resolution with optional blurring. – See Section 3.21 (on page 45)
 22. Inv Fourier Xform (bis_rfftimage) computes inverse fourier transform. – See Section 3.22 (on page 47)
 23. Shift/Scale Image (bis_shiftscaleimage) computes linear intensity transformation – See Section 3.23 (on page 49)
 24. Smooth Image (bis_smoothimage) Smooths an image with a specific gaussian kernel. – See Section 3.24 (on page 50)
 25. Threshold Image (bis_thresholdimage) thresholds an image to generate a binary output using a specific threshold. – See Section 3.25 (on page 52)

Image Processing-4D

1. Combine Frames (bis_combineframes) Takes in a 4d image and creates a 3d mean, maximum, sum, minimum, or magnitude – See Section 4.1 (on page 54)
2. Exponential Fit Image (bis_exponentialfitimage) Computes a T2-fit (or other decaying exponential) from a 4D image – See Section 4.2 (on page 55)
3. Remove Frames (bis_imageremoveframes) Extracts frames from a 4D image – See Section 4.3 (on page 57)
4. Interleave Frames (bis_interleave) interleaves image. – See Section 4.4 (on page 59)
5. Median Temporal Smooth (bis_mediantemporalsmoothimage) Smooth an image with median filter. – See Section 4.5 (on page 60)
6. 4D Preprocess Image (bis_preprocessimage) Preprocess an image. – See Section 4.6 (on page 62)
7. Remove Slice Mean (bis_remove slicemean) Remove Slice/Volume Mean. – See Section 4.7 (on page 64)
8. Temporal Drift Removal (bis_remove temporaldrift) Correct the drift of an image. – See Section 4.8 (on page 65)
9. Temporal Smooth (bis_temporalsmoothimage) Temporal smoothing with Gaussian kernel. – See Section 4.9 (on page 67)

Image Processing Dual

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1. Bias Field (`bis_biasfield`) corrects bias field – See Section 5.1 (on page 69)
 2. Image Blend (`bis_blendimage`) blends an image using one or more transformations. – See Section 5.2 (on page 71)
 3. CheckerBoard (`bis_checkerboardimage`) Creates checkerboard image – See Section 5.3 (on page 72)
 4. Color Blend Image (`bis_colorblendimage`) Creates colorblend image – See Section 5.4 (on page 74)
 5. Create Image Overlay (`bis_createoverlayimage`) createoverlays an image using one or more transformations. – See Section 5.5 (on page 76)
 6. CSF WM Motion Correction (`bis_csfwmmotioncorr`) Preprocessing: remove artifacts from cerebrospinal fluid, brain white matter and motion correction. – See Section 5.6 (on page 78)
 7. Compute FDR (`bis_fdr`) Compute False Detection Rate. – See Section 5.7 (on page 80)
 8. Compute Image Comparison (`bis_imagecompare`) Add, Subtract, Multiply or Divide two images to give an output. NormalT and PairedT assumed 4D Images and perform t-test comparisons – See Section 5.8 (on page 81)
 9. Math Operations (`bis_imagemathoperations`) Add, Subtract, Multiply or Divide two images to give an output. – See Section 5.9 (on page 83)
 10. Manual Reslice (`bis_manualreslice`) reslices an image using one or more transformations. – See Section 5.10 (on page 85)
 11. Mask Image (`bis_maskimage`) blends an image using one or more transformations. – See Section 5.11 (on page 86)
 12. Image Reslice (`bis_resliceimage`) reslices an image using one or more transformations. – See Section 5.12 (on page 88)
 13. ROI Mean (`bis_roimean`) Calculate the mean time course of each ROI defined by ROI mask. – See Section 5.13 (on page 90)
 14. Math Operations (`bis_singleimagemathoperations`) Image to Image algorithm that does more complex operations than `bis_imagemathoperations` – See Section 5.14 (on page 91)
 15. Slice Inhomogeneity (`bis_sliceinhomogeneity`) corrects slice inhomogeneity correction for MRI acquisitions. – See Section 5.15 (on page 93)
 16. Stitch images (`bis_stitchimage`) Stitches images – See Section 5.16 (on page 95)
 17. Compute T-Test (`bis_ttest`) t test. – See Section 5.17 (on page 96)

Image Processing Multiple

1. Combine Set of Images (`bis_combineimages`) Takes in a set of 3d images and creates a 3d mean, maximum, sum or minimum – See Section 6.1 (on page 99)
2. Concatenate Set of 3D Images (`bis_create4dimage`) combines a number of 3D volumes into a single 4D image. – See Section 6.2 (on page 100)

Surface Processing

1. Clean Surface (`bis_cleansurface`) smooths a surface – See Section 7.1 (on page 103)
2. Clip Surface (`bis_clipsurface`) Clip polygonal data with user-specified implicit function or input scalar data – See Section 7.2 (on page 104)
3. Compute Normals (`bis_computenormals`) computes normals of a surface – See Section 7.3 (on page 106)
4. Connect (`bis_connect`) Extract polygonal data based on geometric connectivity – See Section

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- 7.4 (on page 107)
 - 5. Curvatures (`bis_curvatures`) computes curvatures of a surface – See Section 7.5 (on page 109)
 - 6. Decimate (`bis_decimate`) decimate a surface – See Section 7.6 (on page 111)
 - 7. Delaunay Triangulation (`bis_delaunay3D`) Delaunay triangulation of a surface – See Section 7.7 (on page 112)
 - 8. Extract Objectmap (`bis_extractobjectmap`) Extract a surface from an objectmap (image) – See Section 7.8 (on page 114)
 - 9. Extract Surface (`bis_extractsurface`) Extract a surface from an image – See Section 7.9 (on page 115)
 - 10. Smooth Surface (`bis_smoothsurface`) smoothing a surface – See Section 7.10 (on page 117)
 - 11. Subdivide (`bis_subdivide`) subdividing a surface – See Section 7.11 (on page 119)
 - 12. Threshold points (`bis_thresholdpoints`) Extract a surface from an image – See Section 7.12 (on page 120)
 - 13. Transform Surface (`bis_transformsurface`) Transforms (warps) a surface using a transformation – See Section 7.13 (on page 122)
 - 14. Triangulate (`bis_triangulate`) triangulate a surface – See Section 7.14 (on page 123)

Registration

- 1. Combine Transformations (`bis_combinetransformations`) computes a combined (optionally inverse) transformation for a set transformation given an image to define the space. – See Section 8.1 (on page 125)
- 2. Compute Displacement Field (`bis_computedisplacementfield`) computes the displacement field for a transformation given an image to define the space. – See Section 8.2 (on page 127)
- 3. Compute Overlap (`bis_computeoverlap`) computes overlap metrics of the pre-segmented structures after registration. – See Section 8.3 (on page 128)
- 4. Compute Similarity (`bis_computesimilarity`) computes image similarity measures between the reference image and the target image after a transform and optionally point distances between the reference surface and the target surface. – See Section 8.4 (on page 130)
- 5. Linear Registration (`bis_linearintensityregister`) computes a linear intensity based registrations. – See Section 8.5 (on page 132)
- 6. Linear RPM (`bis_linearpointregister`) computes a linear point based registrations. – See Section 8.6 (on page 134)
- 7. Manual Registration (`bis_manualregistration`) Computes a manual registration of an image – See Section 8.7 (on page 136)
- 8. Distortion Cor (`bis_nonlineardistortioncorrection`) Computes non-linear distortion corrections for echoplanar images. – See Section 8.8 (on page 138)
- 9. NonLinear Reg (`bis_nonlinearintensityregister`) computes a linear intensity based registrations. – See Section 8.9 (on page 140)
- 10. NonLinear RPM (`bis_nonlinearpointregister`) computes a linear point-based registrations. – See Section 8.10 (on page 143)
- 11. Serial Demons Mouse Registration (`bis_serialedemonmouserereg`) Serial demon registration – See Section 8.11 (on page 145)
- 12. Compute Jacobian (`bis_singlejacobian`) computes either the determinant of the jacobian or the full tensor for a transformation. – See Section 8.12 (on page 146)
- 13. Visualize Transformation (`bis_visualizetransformation`) Creates a grid visualization of a transformation – See Section 8.13 (on page 148)

Segmentation

1. Intensity Segmentation (`bis_intsegment`) segment image. – See Section 9.1 (on page 151)
2. Tissue Levelset (`bis_levelset`) Performs levelset segmentation using the levelset method of Chan and Vesse with bi-exponential output extensions – See Section 9.2 (on page 153)
3. Strip Skull (`bis_stripskull`) Performs skull stripping – See Section 9.3 (on page 155)

Functional Imaging

1. Compute Correlations (`bis_computecorrelations`) Compute Correlations between the 4D image as input 1 and the measures in filename. 4D Image must have the same number of frames as the subjects in the filename. – See Section 10.1 (on page 159)
2. Compute GLM Regression (`bis_computeglm`) Compute GLM Fit using Matrix to define regressors. Optionally save the residual image. – See Section 10.2 (on page 161)
3. Matrix Correlation (`bis_matrixcorrelation`) Calculate correlation among time series. – See Section 10.3 (on page 162)
4. MultiSubject fMRI (`bis_multisubjectfmri`) Mostly a test class for `pxitclmultisubject.tcl` based multi subject operations – See Section 10.4 (on page 164)
5. R-value to 1-p value (`bis_rtopvalue`) Converts r value to 1-p value. – See Section 10.5 (on page 165)
6. R-value to T-Score (`bis_rtotmap`) convert r value to t value. – See Section 10.6 (on page 167)
7. Seed Correlation (`bis_seedcorrelation`) Correlation between brain and ROIs. – See Section 10.7 (on page 168)
8. MultiSubject fMRI (`bis_singlesubjectfmri`) Mostly a test class for `bis_fmrisetup.tcl` based single subject fMRI Operations – See Section 10.8 (on page 170)
9. T-score to P-value (`bis_tmaptopvalue`) converts tmap to pvalue. – See Section 10.9 (on page 172)
10. T-score to Z-score (`bis_tmaptozscore`) converts tmap to zscore. – See Section 10.10 (on page 173)
11. Zmap to pvalue (`bis_zscoretopvalue`) Converts zmap to pvalue. – See Section 10.11 (on page 175)

DiffSPECT

1. ISAS (`bis_ISAS`) – See Section 11.1 (on page 177)
2. Diff SPECT with ISASHN (`bis_ISASHN`) – See Section 11.2 (on page 179)
3. Calculate RF (`bis_spectrf`) Computes Statistics for DIFF Spect Analysis – See Section 11.3 (on page 181)

Diffusion Tensor

1. Compute Tensor (`bis_computetensor`) Given Raw DWI images, it estimates the symmetric 6-component tensor – See Section 12.1 (on page 183)
2. Tensor Reslice (`bis_reslicetensor`) Reslices an tensor/vector image using one or more transformations. – See Section 12.2 (on page 185)
3. Compute DTI Maps (`bis_tensoranalysis`) computes FA map, orientation map and optionally (RA, MD, VR, CI). – See Section 12.3 (on page 187)

Vascular Imaging

1. Frangi Vesselness (`bis_frangivesselness`) computes the multiscale hessian tensor and associated vesselness and scale images from Frangi 1998. – See Section 13.1 (on page 189)
2. Qian Vesselness (`bis_qianvesselness`) computes the non-parameteric vesselness measure from Qian et al, MedIA 2009. – See Section 13.2 (on page 191)

Landmarks Processing

1. Resample Landmarks (`bis_resamplelandmarks`) Sampling/Sub-sampling curves stored as landmarks – See Section 14.1 (on page 194)
2. Smooth Landmarks (`bis_smoothlandmarks`) Smoothing a curve stored as landmarks – See Section 14.2 (on page 195)

Utility

1. DICOM 2 NIFTI (`bis_dicom2nifti`) This script parses a directory containing DICOM images and creates NIFTI output files – See Section 15.1 (on page 198)
2. Image Info (`bis_headerinfo`) prints NIFTI/Analyze image header. – See Section 15.2 (on page 199)
3. Make Batch (`bis_makebatch`) Creates a makefile given a batch input definition file – See Section 15.3 (on page 201)
4. Split 4D Image (`bis_split4dimage`) extracts 3D volumes from the beginning time-frame to the ending time-frame from a 4D image. – See Section 15.4 (on page 202)
5. Surface Info (`bis_surfaceinfo`) prints information about .vtk surface files. – See Section 15.5 (on page 204)

Chapter 3

Image Processing

3.1 Cast Image (bis_castimage)

Description: bis_castimage.tcl – cast (or convert) image data type.

Synopsis: bis_castimage.tcl [--inp] [--out] [--type] [--dogui]
[--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
[--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]
[--ctestcreategold] [--ctestgui]

Detailed Description: bis_castimage.tcl cast (or convert) image data type. type can be one of float, double, or short

[Inputs]

- input_image (command line option -inp) : Input Image

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- type : output image type. Specify one of Float , Double or Short. Default value is "Float". Allowed values = [Float, Double, Short]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: N/A.

Authors: hirohito.okuda@yale.edu

3.2 Cluster Threshold (bis_clusterthresholdimage)

Description: bis_clusterthresholdimage.tcl – thresholds an image to generate a binary output using a specific threshold and clusters to a certain voxel size.

Synopsis: `bis_clusterthresholdimage.tcl` [--inp] [--out] [--clustersize] [--oneconnected]
 [--outputclustno] [--absolutevalue] [--frame] [--minth] [--maxth]
 [--inverse] [--binary] [--dogui] [--pset] [--slicermode]
 [--loni] [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir]
 [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_clusterthresholdimage.tcl` thresholds an image to generate a binary output using a specific threshold and clusters to a certain voxel size. The output is a binary image with value = 100 where the original image had values above the threshold and zero elsewhere.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `clustersize` : Cluster Threshold Value. Default value is "100". Allowed range is from 0 to 100000000
- `oneconnected` : Use 1-Connected Clustering (if off use 3x3x3 cube around voxel, if on using 6 neighbors of voxel). Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `outputclustno` : Output Cluster Number. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `absolutevalue` : Cluster Based on Absolute Value of input. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `frame` : Frame to use when clustering. Default value is "1". Allowed range is from 0 to 100000000
- `minth` : Lower Threshold value. Default value is "0.0". Allowed range is from -100000000.0 to 100000000.0
- `maxth` : Upper Threshold value. Default value is "100.0". Allowed range is from -100000000.0 to 100000000.0
- `inverse` : Inverse Threshold. Default value is "Off". Allowed values = [On, Off]
- `binary` : Binary Output. Default value is "Off". Allowed values = [Off, On, x100]

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2

- `ctest` : Enable the running of `ctest` automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_basethresholdimage.tcl`

Authors: `hirohito.okuda@yale.edu`, `xenophon.papademetris@yale.edu`.

3.3 Convolve Image (`bis_convolveimage`)

Description: `bis_convolveimage.tcl` – Convolves an image with a specific gaussian/gaussian derivative/hessian kernel.

Synopsis: `bis_convolveimage.tcl` [`--inp`] [`--out`] [`--out2`] [`--blursigma`]
[`--unit`] [`--radius`] [`--mode`] [`--dogui`] [`--pset`]
[`--slicermode`] [`--loni`] [`--ctest`] [`--ctestline`] [`--ctestsave`]
[`--ctesttmpdir`] [`--ctestexact`] [`--ctestthr`] [`--ctestdebug`] [`--ctestcreategold`]
[`--ctestgui`]

Detailed Description: `bis_convolveimage.tcl` Convolves an image with a specific gaussian/gaussian derivative/hessian kernel. Convolving kernel size blursigma (in mm by default) represents the FWHM filter size.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image
- `filterbank` (command line option `-out2`) : FilterBank Image

[Options]

- `blursigma` : kernel size [mm/voxel] of FWHM filter size. Default value is "2.0". Allowed range is from 0.0 to 20.0
- `unit` : kernel size unit mm or voxels . Default value is "mm". Allowed values = [mm, voxels]
- `radius` : radius factor of the gaussian in voxel units . Default value is "1.5". Allowed range is from 0.0 to 5.0
- `mode` : Operation to perform. Default value is "Smooth". Allowed values = [Smooth, Gradient, Hessian]

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: hirohito.okuda@yale.edu, xenophon.papademetris@yale.edu.

3.4 Crop Image (bis_cropimage)

Description: `bis_cropimage.tcl` – Crops an image with a specific cropping window/radius.

Synopsis: `bis_cropimage.tcl` [--inp] [--out] [--startx] [--stopx]
 [--ratex] [--starty] [--stopy] [--ratey] [--startz]
 [--stopz] [--ratez] [--startt] [--stopt] [--ratet]
 [--blank] [--autocrop] [--autocroppad] [--dogui] [--pset]
 [--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave]
 [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold]
 [--ctestgui]

Detailed Description: `bis_cropimage.tcl` Crops an image with a specific cropping window/radius. Optionally can be used to blank image or autocrop.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- startx : Start Value of Crop Region in X. Default value is "0". Allowed range is from -100 to 1999
- stopx : End Value of Crop Region in X. Default value is "-1". Allowed range is from -100 to 1999
- ratex : X Increment for Cropping. Default value is "1". Allowed range is from 1 to 50
- starty : Start Value of Crop Region in Y. Default value is "0". Allowed range is from -100 to 1999
- stopy : End Value of Crop Region in Y. Default value is "-1". Allowed range is from -100 to 1999
- ratey : Y Increment for Cropping. Default value is "1". Allowed range is from 1 to 50
- startz : Start Value of Crop Region in Z. Default value is "0". Allowed range is from -100 to 1999
- stopz : End Value of Crop Region in Z. Default value is "-1". Allowed range is from -100 to 1999
- ratez : Z Increment for Cropping. Default value is "1". Allowed range is from 1 to 50
- startt : Start Value of Crop Region in T. Default value is "1". Allowed range is from 1 to 999
- stopt : End Value of Crop Region in T. Default value is "999". Allowed range is from 1 to 999
- ratet : T Increment for Cropping. Default value is "1". Allowed range is from 1 to 50
- blank : If set to on perform blank instead of crop. Default value is "off". Allowed values = [on, off]
- autocrop : If set to on perform autocrop instead of crop. Default value is "off". Allowed values = [on, off]
- autocroppad : Padding Value Used for AutoCropping factor of the gaussian in voxel units . Default value is "2". Allowed range is from 0 to 10

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999

- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from GUI code in `pxitclimageutility.tcl`.

Authors: `xenophon.papademetris@yale.edu`.

3.5 C-Blank Image (`bis_cylindricalcropimage`)

Description: `bis_cylindricalcropimage.tcl` – Blanks an image with a specific cylinder.

Synopsis: `bis_cylindricalcropimage.tcl` `--inp` `--out` `--centerx` `--centery` `--radius` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_cylindricalcropimage.tcl` Blanks an image with a specific cylinder. Values inside the cylinder are preserved, outside are set to 0

[Inputs]

- `input_image` (command line option `--inp`) : Input Image

[Outputs]

- `output_image` (command line option `--out`) : Output Image

[Options]

- centerx : Cylinder Center X-coordinate (voxels). Default value is "0". Allowed range is from 0 to 1000
- centery : Cylinder Center Y-coordinate (voxels). Default value is "0". Allowed range is from 0 to 1000
- radius : Cylinder Radius (voxels). Default value is "20". Allowed range is from 0 to 1000

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from GUI code in `pxitclimageutility.tcl`.

Authors: xenophon.papademetris@yale.edu.

3.6 Signed DistanceMap (bis_distancemapimage)

Description: bis_distancemapimage.tcl – Create a distance map from a binarized image

Synopsis: bis_distancemapimage.tcl [--inp] [--out] [--minth] [--maxth]
[--invalue] [--outvalue] [--radius] [--dogui] [--pset]
[--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave]
[--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold]
[--ctestgui]

Detailed Description: bis_distancemapimage.tcl Create a distance map from a binarized image

[Inputs]

- input_image (command line option -inp) : Input Image

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- minth : Lower Threshold value. Default value is "1.0". Allowed range is from -100000000.0 to 100000000.0
- maxth : Upper Threshold value. Default value is "200000.0". Allowed range is from -100000000.0 to 100000000.0
- invalue : In Threshold value. Default value is "3000.0". Allowed range is from -100000000.0 to 100000000.0
- outvalue : Out Threshold value. Default value is "0.0". Allowed range is from -100000000.0 to 100000000.0
- radius : Radius used in dilation filter . Default value is "1". Allowed range is from 0 to 10

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2

- **ctest** : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: None

Authors: hirohito.okuda@yale.edu, xenophon.papademetris@yale.edu.

3.7 Edge Detection (*bis_edgedetectimage*)

Description: *bis_edgedetectimage.tcl* – Computes an edge map for an image following smoothing

Synopsis: *bis_edgedetectimage.tcl* [--inp] [--out] [--blursigma] [--unit]
[--mode] [--nonmax] [--dogui] [--pset] [--slicermode]
[--loni] [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir]
[--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: *bis_edgedetectimage.tcl* Computes an edge map for an image following smoothing first smooths the image than finds the edges

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `blursigma` : kernel size [mm/voxel] of FWHM filter size. Default value is "2.0". Allowed range is from 0.0 to 20.0
- `unit` : kernel size unit mm or voxels . Default value is "mm". Allowed values = [mm, voxels]
- `mode` : Use image gradient or raw intensity. Default value is "gradient". Allowed values = [intensity, gradient]
- `nonmax` : Use Non-Maximal Suppression. Default value is "1". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)

- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: New

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3.8 Fourier Transform (`bis_fftimage`)

Description: `bis_fftimage.tcl` – computes the fourier transformation of an image.

Synopsis: `bis_fftimage.tcl` [`--inp`] [`--out`] [`--dimension`] [`--fftoperation`]
[`--dogui`] [`--pset`] [`--slicermode`] [`--loni`] [`--ctest`]
[`--ctestline`] [`--ctestsave`] [`--ctesttmpdir`] [`--ctestexact`] [`--ctestthr`]
[`--ctestdebug`] [`--ctestcreategold`] [`--ctestgui`]

Detailed Description: `bis_fftimage.tcl` computes the fourier transformation of an image. outputs can either of the zero frequency at the center or at the corners depending on options

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `dimension` : dimension of fourier transform operation. The default value is 3. . Default value is "3". Allowed range is from 2 to 3
- `fftoperation` : if true, the algorithm will shift the zeroth frequency to the center of the image. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: N/A

Authors: hirohito.okuda@yale.edu.,

3.9 Flip Image (`bis_flipimage`)

Description: `bis_flipimage.tcl` – flips image about one of the coordinate axes.

Synopsis: `bis_flipimage.tcl` [--inp] [--out] [--direction] [--dogui]
[--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
[--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]
[--ctestcreategold] [--ctestgui]

Detailed Description: `bis_flipimage.tcl` flips image about one of the coordinate axes.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `direction` : flip direction X,Y,Z. Default value is "Z". Allowed values = [X, Y, Z]

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)

- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_flip.tcl`. Multiple image processing eliminated, which will be recovered upon request.

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3.10 Dilate/Erode Filter (bis_imagedilate)

Description: `bis_imagedilate.tcl` – Modifies an image using continuous dilation filtering

Synopsis: `bis_imagedilate.tcl` `--inp` `--out` `--windowsize` `--dimension` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_imagedilate.tcl` Modifies an image using continuous dilation filtering

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `windowsize` : kernel size [voxels] -ve values = erosion. Default value is "3". Allowed values = [-9, -7, -5, -3, 3, 5, 7, 9]
- `dimension` : 2 or 3 to do dilation/erosion in 2D or 3D. Default value is "3". Allowed values = [2, 3]

[Common Options]

- **dogui** : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **pset** : Use Parameter set to set parameters. Default value is "".
- **slicermode** : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **loni** : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- **ctest** : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: New

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3.11 Median Filter (bis_imagemedian)

Description: bis_imagemedian.tcl – Smoothes an image using median filtering

Synopsis: `bis_imagemedian.tcl` [--inp] [--out] [--windowsize] [--dimension]
[--dogui] [--pset] [--slicermode] [--loni] [--ctest]
[--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr]
[--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_imagemedian.tcl` Smoothes an image using median filtering

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `windowsize` : kernel size [voxels]. Default value is "3". Allowed values = [3, 5, 7, 9]
- `dimension` : 2 or 3 to do smoothin in 2D or 3D. Default value is "3". Allowed values = [2, 3]

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".

- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: New

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3.12 Threshold By List (*bis_listthresholdimage*)

Description: `bis_listthresholdimage.tcl` – thresholds an image to generate a binary output using a specific threshold.

Synopsis: `bis_listthresholdimage.tcl` [--inp] [--out] [--list] [--inverse]
[--binary] [--dogui] [--pset] [--slicermode] [--loni]
[--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
[--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_listthresholdimage.tcl` thresholds an image to generate a binary output using a specific threshold. The output is a binary image with value = 100 where the original image had values above the threshold and zero elsewhere.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `list` : Threshold Image List (as opposed to thresholds). Default value is "".

- inverse : Inverse Threshold. Default value is "Off". Allowed values = [On, Off]
- binary : Binary Output. Default value is "Off". Allowed values = [Off, On, x100]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from pxmat_listthresholdimage.tcl

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3.13 Log Image (bis_logimage)

Description: bis_logimage.tcl – computes linear intensity transformation

Synopsis: bis_logimage.tcl [--inp] [--out] [--scale] [--dogui]
[--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
[--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]
[--ctestcreategold] [--ctestgui]

Detailed Description: bis_logimage.tcl computes linear intensity transformation Output intensity = scale *(Input intensity + shift).Data is thresholded so that the output value does not exceed the max or min of the data type.

[Inputs]

- input_image (command line option -inp) : Input Image

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- scale : Scale Output to be 0:255. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999

- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: N/A.

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3.14 ReOrient Image (bis_newreorientimage)

Description: `bis_newreorientimage.tcl` – newreorients an image to a given orientation.

Synopsis: `bis_newreorientimage.tcl` [--inp] [--out] [--orientation] [--dogui]
[--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
[--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]
[--ctestcreategold] [--ctestgui]

Detailed Description: `bis_newreorientimage.tcl` newreorients an image to a given orientation. Output orientation is one of default six including LPS or RAS. The input orientation is detected automatically. This tool does not reslice oblique images, it simply permutes/flips the axis only.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- orientation : orientation of output image either axial LPS or axial RAS, coronal LIP or RSA or sagittal PSR or ASR. Default value is "LPS". Allowed values = [LPS, RAS, LIP, RSA, PSR, ASR]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

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3.15 Anisotropic Diffusion (*bis_nonlinearsmoothimage*)

Description: *bis_nonlinearsmoothimage.tcl* – Smooths an image using anisotropic diffusion filtering

Synopsis: *bis_nonlinearsmoothimage.tcl* [--inp] [--out] [--threshold] [--factor]
[--iterations] [--mode] [--dimension] [--dogui] [--pset]
[--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave]
[--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold]
[--ctestgui]

Detailed Description: *bis_nonlinearsmoothimage.tcl* Smooths an image using anisotropic diffusion filtering

[Inputs]

- *input_image* (command line option *-inp*) : Input Image

[Outputs]

- *output_image* (command line option *-out*) : Output Image

[Options]

- *threshold* : Threshold for Anisotropic Diffusion. Default value is "30". Allowed range is from 1 to 20000
- *factor* : Lambda factor Regular Anisotropic Diffusion. Default value is "1.0". Allowed range is from 0.2 to 10.0
- *iterations* : Number of Iterations. Default value is "4". Allowed range is from 1 to 20
- *mode* : Use intensity difference or gradient difference as constraint. Default value is "intensity". Allowed values = [intensity, gradient]
- *dimension* : 2 or 3 to do smoothin in 2D or 3D. Default value is "3". Allowed values = [2, 3]

[Common Options]

- *dogui* : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- *pset* : Use Parameter set to set parameters. Default value is "".

- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: New**Authors:** hirohito.okuda@yale.edu, xenophon.papademetris@yale.edu.

3.16 PiecewiseMap (bis_piecewiseimagemap)

Description: bis_piecewiseimagemap.tcl – Performs piecewise mapping of an image using a linear spline with prescribed knots.**Synopsis:** bis_piecewiseimagemap.tcl [--inp] [--out] [--type] [--on1]
[--x1] [--y1] [--on2] [--x2] [--y2]

```
[--on3 ] [--x3 ] [--y3 ] [--on4 ] [--x4 ]
[--y4 ] [--on5 ] [--x5 ] [--y5 ] [--on6 ]
[--x6 ] [--y6 ] [--on7 ] [--x7 ] [--y7 ]
[--on8 ] [--x8 ] [--y8 ] [--dogui ] [--pset ]
[--slicermode ] [--loni ] [--ctest ] [--ctestline ] [--ctestsave ]
[--ctesttmpdir ] [--ctestexact ] [--ctestthr ] [--ctestdebug ] [--ctestcreategold ]
[--ctestgui ]
```

Detailed Description: `bis_piecewiseimagemap.tcl` Performs piecewise mapping of an image using a linear spline with prescribed knots.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `type` : output image type. Specify one of Default (same as input) UnsignedChar Short Float Double. Default value is "Default". Allowed values = [Default, UnsignedChar, Float, Double, Short]
- `on1` : enable knot 1. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `x1` : input value for knot 1. Default value is "0.0". Allowed range is from -10000000000 to 10000000000
- `y1` : output value for knot 1. Default value is "0.0". Allowed range is from -10000000000 to 10000000000
- `on2` : enable knot 2. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `x2` : input value for knot 2. Default value is "0.0". Allowed range is from -10000000000 to 10000000000
- `y2` : output value for knot 2. Default value is "0.0". Allowed range is from -10000000000 to 10000000000
- `on3` : enable knot 3. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `x3` : input value for knot 3. Default value is "0.0". Allowed range is from -10000000000 to 10000000000
- `y3` : output value for knot 3. Default value is "0.0". Allowed range is from -10000000000 to 10000000000
- `on4` : enable knot 4. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `x4` : input value for knot 4. Default value is "0.0". Allowed range is from -10000000000 to 10000000000
- `y4` : output value for knot 4. Default value is "0.0". Allowed range is from -10000000000 to 10000000000
- `on5` : enable knot 5. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

- **x5** : input value for knot 5. Default value is "0.0". Allowed range is from -10000000000 to 10000000000
- **y5** : output value for knot 5. Default value is "0.0". Allowed range is from -10000000000 to 10000000000
- **on6** : enable knot 6. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **x6** : input value for knot 6. Default value is "0.0". Allowed range is from -10000000000 to 10000000000
- **y6** : output value for knot 6. Default value is "0.0". Allowed range is from -10000000000 to 10000000000
- **on7** : enable knot 7. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **x7** : input value for knot 7. Default value is "0.0". Allowed range is from -10000000000 to 10000000000
- **y7** : output value for knot 7. Default value is "0.0". Allowed range is from -10000000000 to 10000000000
- **on8** : enable knot 8. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **x8** : input value for knot 8. Default value is "0.0". Allowed range is from -10000000000 to 10000000000
- **y8** : output value for knot 8. Default value is "0.0". Allowed range is from -10000000000 to 10000000000

[Common Options]

- **dogui** : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **pset** : Use Parameter set to set parameters. Default value is "".
- **slicermode** : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **loni** : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- **ctest** : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)

- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from code in `pxitcloverlaytool.tcl`

Authors: `hirohito.okuda@yale.edu`, `xenophon.papademetris@yale.edu`.

3.17 Proportional Scale Image (`bis_proportionalscale`)

Description: `bis_proportionalscale.tcl` – Proportional scales input images to the mean specified in the options.

Synopsis: `bis_proportionalscale.tcl` `--inp` `]` `--out` `]` `--mean` `]` `--threshold` `]`
`--dogui` `]` `--pset` `]` `--slicermode` `]` `--loni` `]` `--ctest` `]`
`--ctestline` `]` `--ctestsave` `]` `--ctesttmpdir` `]` `--ctestexact` `]` `--ctestthr` `]`
`--ctestdebug` `]` `--ctestcreategold` `]` `--ctestgui` `]`

Detailed Description: `bis_proportionalscale.tcl` Proportional scales input images to the mean specified in the options. sets all voxels of intensity less than `threshold*mean` to zero

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `mean` : The mean to which the image is scaled to. Default value is "50.0". Allowed range is from 0.0 to 200.0
- `threshold` : Images with be thresholded at `threshold*mean`. Default value is "0.8". Allowed range is from 0.0 to 2.0

[Common Options]

- **dogui** : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **pset** : Use Parameter set to set parameters. Default value is "".
- **slicermode** : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **loni** : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- **ctest** : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: dustin.scheinost@yale.edu

3.18 Regularize Objectmap (bis_regularizeobjectmap)

Description: `bis_regularizeobjectmap.tcl` – Regularizes an objectmap (an image where each value represents an object) to smooth manual segmentations

Synopsis: `bis_regularizeobjectmap.tcl` [--inp] [--out] [--lambda] [--epsilon]
[--maxobjects] [--maxiter] [--dogui] [--pset] [--slicermode]
[--loni] [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir]
[--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_regularizeobjectmap.tcl` Regularizes an objectmap (an image where each value represents an object) to smooth manual segmentations

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `lambda` : Relaxation factor for smoothing the objectmap. Default value is "2.0". Allowed range is from 0.5 to 50.0
- `epsilon` : Convergence factor as % of voxels changed . Default value is "0.2". Allowed range is from 0.01 to 2.0
- `maxobjects` : Maximum number of labels in objectmap . Default value is "128". Allowed range is from 2 to 512
- `maxiter` : Maximum number of iterations . Default value is "25". Allowed range is from 1 to 512

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: hirohito.okuda@yale.edu, xenophon.papademetris@yale.edu.

3.19 Relabel Header (bis_relabelimage)

Description: bis_relabelimage.tcl – relabels an image to a given orientation. Output orientation is 0=axial, 1=coronal, or 2=sagittal.

Synopsis: bis_relabelimage.tcl [--inp] [--out] [--orientation] [--dogui]
 [--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
 [--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]
 [--ctestcreategold] [--ctestgui]

Detailed Description: bis_relabelimage.tcl relabels an image to a given orientation. Output orientation is 0=axial, 1=coronal, or 2=sagittal.

[Inputs]

- input_image (command line option -inp) : Input Image

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- orientation : orientation of image axial,coronal,sagittal. Default value is "axial". Allowed values = [axial, coronal, sagittal]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999

- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_relabelimage.tcl`

Authors: `hirohito.okuda@yale.edu`, `xenophon.papademetris@yale.edu`.

3.20 Reorient Image (`bis_reorientimage`)

Description: `bis_reorientimage.tcl` – reorients an image to a given orientation.

Synopsis: `bis_reorientimage.tcl` `--inp` `--out` `--orientation` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_reorientimage.tcl` reorients an image to a given orientation. Output orientation is 0=axial, 1=coronal, or 2=sagittal. The input orientation is detected automatically.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `orientation` : orientation of image axial,coronal,sagittal. Default value is "axial". Allowed values = [axial, coronal, sagittal]

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2

- `ctest` : Enable the running of `ctest` automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_reorientimage.tcl`

Authors: `hirohito.okuda@yale.edu`, `xenophon.papademetris@yale.edu`.

3.21 Resample Image (`bis_resampleimage`)

Description: `bis_resampleimage.tcl` – Resamples an image to a specific resolution with optional blurring.

Synopsis: `bis_resampleimage.tcl` `--inp` `--out` `--blurmode` `--vox1` `--vox2` `--vox3` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`]

Detailed Description: `bis_resampleimage.tcl` Resamples an image to a specific resolution with optional blurring. The output dimensions of the voxels in mm are set using `vox1`, `vox2` and `vox3` options. If only `vox1` is specified, `vox1` will be used for `vox2` and `vox3`, and isotropic image is generated.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `blurmode` : 0 or 1 to blur with appropriate FWHM filter. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `vox1` : x voxel size [mm] . Default value is "2.0". Allowed range is from 0.05 to 80.0
- `vox2` : y voxel size [mm] . Default value is "2.0". Allowed range is from 0.05 to 80.0
- `vox3` : z voxel size [mm] . Default value is "2.0". Allowed range is from 0.05 to 80.0

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".

- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_resampleimage.tcl`.

Authors: hirohito.okuda@yale.edu, xenophon.papademetris@yale.edu.

3.22 Inv Fourier Xform (`bis_rfftimage`)

Description: `bis_rfftimage.tcl` – computes inverse fourier transform.

Synopsis: `bis_rfftimage.tcl` [`--inp`] [`--out`] [`--dimension`] [`--fftoperation`] [`--magnitude`] [`--dogui`] [`--pset`] [`--slicermode`] [`--loni`] [`--ctest`] [`--ctestline`] [`--ctestsave`] [`--ctesttmpdir`] [`--ctestexact`] [`--ctestthr`] [`--ctestdebug`] [`--ctestcreategold`] [`--ctestgui`]

Detailed Description: `bis_rfftimage.tcl` computes inverse fourier transform. take in a transformed image or a shifted transform image

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `dimension` : dimension of fourier transform operation. The default value is 3. . Default value is "3". Allowed values = [2, 3]

- `fftoperation` : if true, the algorithm will look for the zeroth frequency at the center of the image. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `magnitude` : if true, the algorithm will compute the magnitude of the final image. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: N/A.

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3.23 Shift/Scale Image (bis_shiftscaleimage)

Description: bis_shiftscaleimage.tcl – computes linear intensity transformation

Synopsis: bis_shiftscaleimage.tcl [--inp] [--out] [--shift] [--scale]
[--abs] [--type] [--dogui] [--pset] [--slicermode]
[--loni] [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir]
[--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_shiftscaleimage.tcl computes linear intensity transformation Output intensity = scale *(Input intensity + shift). Data is thresholded so that the output value does not exceed the max or min of the data type.

[Inputs]

- input_image (command line option -inp) : Input Image

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- shift : Shift factor. Default value is "0.0". Allowed range is from -100000000.0 to 100000000.0
- scale : Scale factor . Default value is "1.0". Allowed range is from -100000000.0 to 100000000.0
- abs : Do Absolute Value First. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- type : output image type. Specify one of Same (same as input), Float , Double or Short. Default value is "Same". Allowed values = [Same, Short, Float, Double]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: N/A.

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3.24 Smooth Image (`bis_smoothimage`)

Description: `bis_smoothimage.tcl` – Smooths an image with a specific gaussian kernel.

Synopsis: `bis_smoothimage.tcl` [--inp] [--out] [--blursigma] [--unit]
[--radius] [--dimension] [--dogui] [--pset] [--slicermode]
[--loni] [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir]
[--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_smoothimage.tcl` Smooths an image with a specific gaussian kernel. Smoothing kernel size `blursigma` (in mm by default) represents the FWHM filter size.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `blursigma` : kernel size [mm/voxel] of FWHM filter size. Default value is "2.0". Allowed range is from 0.0 to 20.0
- `unit` : kernel size unit mm or voxels . Default value is "mm". Allowed values = [mm, voxels]
- `radius` : radius factor of the gaussian in voxel units . Default value is "1.5". Allowed range is from 0.0 to 5.0
- `dimension` : 2 or 3 to do smoothing in 2D or 3D. Default value is "3". Allowed values = [2, 3]

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999

- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_smoothimage.tcl`. `unit` and `radius` options are added. Multiple image processing eliminated, which will be recovered upon request.

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3.25 Threshold Image (`bis_thresholdimage`)

Description: `bis_thresholdimage.tcl` – thresholds an image to generate a binary output using a specific threshold.

Synopsis: `bis_thresholdimage.tcl` `--inp` `--out` `--setmintozero` `--minth` `--maxth` `--inverse` `--binary` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_thresholdimage.tcl` thresholds an image to generate a binary output using a specific threshold. The output is a binary image with value = 100 where the original image had values above the threshold and zero elsewhere.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `setmintozero` : Set Minimum Value to Zero. Default value is "Off". Allowed values = [On, Off]
- `minth` : Lower Threshold value. Default value is "0.0". Allowed range is from -100000000.0 to 100000000.0
- `maxth` : Upper Threshold value. Default value is "100.0". Allowed range is from -100000000.0 to 100000000.0
- `inverse` : Inverse Threshold. Default value is "Off". Allowed values = [On, Off]
- `binary` : Binary Output. Default value is "Off". Allowed values = [Off, On, x100]

[Common Options]

- **dogui** : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **pset** : Use Parameter set to set parameters. Default value is "".
- **slicermode** : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **loni** : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- **ctest** : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from pxmat_basethresholdimage.tcl

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Chapter 4

Image Processing-4D

4.1 Combine Frames (bis_combineframes)

Description: bis_combineframes.tcl – Takes in a 4d image and creates a 3d mean, maximum, sum, minimum, or magnitude

Synopsis: bis_combineframes.tcl [--inp] [--out] [--mode] [--dogui]
[--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
[--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]
[--ctestcreategold] [--ctestgui]

Detailed Description: bis_combineframes.tcl Takes in a 4d image and creates a 3d mean, maximum, sum, minimum, or magnitude

[Inputs]

- input_image (command line option -inp) : Input Image

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- mode : Combining Mode either Mean,Sum,Min, Max or Magnitude. Default value is "Mean". Allowed values = [Mean, Sum, Min, Max, Magn]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

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4.2 Exponentia Fit Image (bis_exponentialfitimage)

Description: bis_exponentialfitimage.tcl – Computes a T2-fit (or other decaying exponential) from a 4D image

Synopsis: `bis_exponentialfitimage.tcl` `--inp` `--out` `--out2` `--mode` `--t0` `--dt` `--tlist` `--t2` `--reverse` `--maxt2` `--threshold` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_exponentialfitimage.tcl` Computes a T2-fit (or other decaying exponential) from a 4D image

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image
- `density_image` (command line option `-out2`) : Density Image

[Options]

- `mode` : Gen t-values automatically or use list. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `t0` : First t-value. Default value is "15.0". Allowed range is from 0.0 to 50000.0
- `dt` : T-spacing. Default value is "15.0". Allowed range is from 0.0 to 50000.0
- `tlist` : List of t-values. Default value is "".
- `t2` : Output T2 Instead of R2. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `reverse` : Reverse Order of T-times. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `maxt2` : Maximum t2 value to output. Default value is "500.0". Allowed range is from 0.0 to 10000.0
- `threshold` : Do not fit if intensity is below this * max. Default value is "0.05". Allowed range is from 0.0 to 1.0

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from pxitclexpfit.tcl

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4.3 Remove Frames (bis_imageremoveframes)

Description: bis_imageremoveframes.tcl – Extracts frames from a 4D image

Synopsis: bis_imageremoveframes.tcl [--inp] [--out] [--framelist] [--keep]
[--unit] [--offset] [--tr] [--dogui] [--pset]
[--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave]
[--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold]
[--ctestgui]

Detailed Description: bis_imageremoveframes.tcl Extracts frames from a 4D image

[Inputs]

- **input_image** (command line option `-inp`) : Input Image

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- framelist : List of frame pairs to remove e.g. "1 2,7 22,40 52", keep these in quotes. If in frames start at 1, if seconds start at 0.0. Default value is "".
- keep : If set to 1 then the inverse operation is performed, i.e. the frame pairs are kept. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- unit : Frames defined in seconds or frames . Default value is "frames". Allowed values = [frames, seconds]
- offset : Offset from specified values (to be added to the frame list in the same unit as the framelist). Default value is "0.0". Allowed range is from 0.0 to 10.0
- tr : Length of each frame in seconds . Default value is "1.0". Allowed range is from 0.01 to 100.0

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000

- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: New

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4.4 Interleave Frames (`bis_interleave`)

Description: `bis_interleave.tcl` – interleaves image.

Synopsis: `bis_interleave.tcl` `--inp` `--out` `--interleave` `--numframes` `--numslices` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_interleave.tcl` interleaves image.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `interleave` : Reorder Slices/Frames. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `numframes` : number of output frames. Default value is "1". Allowed range is from 1 to 10000
- `numslices` : number of output slices. Default value is "1". Allowed range is from 1 to 10000

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `mpjinterleave.tcl`. Once default output file (`***_inter`) was output, now you need to specify output file name.

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4.5 Median Temporal Smooth (`bis_mediantemporalsmoothimage`)

Description: `bis_mediantemporalsmoothimage.tcl` – Smooth an image with median filter.

Synopsis: `bis_mediantemporalsmoothimage.tcl` [--inp] [--inp2] [--out] [--radius]
 [--usemask] [--dogui] [--pset] [--slicermode] [--loni]
 [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
 [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_mediantemporalsmoothimage.tcl` Smooth an image with median filter. Temporal smoothing using median filter. Length of the kernel is $2 \times \text{radius} + 1$.

[Inputs]

- `input_image` (command line option `-inp`) : Functional Image
- `second_image` (command line option `-inp2`) : Mask Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `radius` : Median Temporal Window size. Default value is "2". Allowed range is from 1 to 9
- `usemask` : Use Mask Image. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".

- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: isabella.murphy@yale.edu, xilin.shen@yale.edu.

4.6 4D Preprocess Image (bis_preprocessimage)

Description: `bis_preprocessimage.tcl` – Preprocess an image.

Synopsis: `bis_preprocessimage.tcl` [--inp] [--inp2] [--out] [--blursigma]
[--order] [--rmslicemean] [--rmvolumemean] [--usemask] [--dogui]
[--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
[--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]
[--ctestcreategold] [--ctestgui]

Detailed Description: `bis_preprocessimage.tcl` Preprocess an image. Preprocess an image with temporal smoothing and/or remove temporal drift and/or remove slice mean or remove volumn mean .

[Inputs]

- `input_image` (command line option `-inp`) : Functional Image
- `second_image` (command line option `-inp2`) : Mask Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- blursigma : kernel sigma (gaussian) in frames. Default value is "0". Allowed range is from 0 to 5
- order : Order of Drift Polynomial. Default value is "3". Allowed range is from -1 to 6
- rmslicemean : Remove Slice Mean . Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- rmvolumemean : Remove Volumn Mean . Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- usemask : Use Mask Image. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: isabella.murphy@yale.edu, xilin.shen@yale.edu.

4.7 Remove Slice Mean (bis_removeslicemean)

Description: bis_removeslicemean.tcl – Remove Slice/Volume Mean.

Synopsis: bis_removeslicemean.tcl [--inp] [--inp2] [--out] [--usemask]
[--globalmean] [--dogui] [--pset] [--slicermode] [--loni]
[--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
[--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_removeslicemean.tcl Remove Slice/Volume Mean. Calculate mean of each slice(frame) or the whole volume and subtract this value from each voxel of that slice(frame).

[Inputs]

- input_image (command line option -inp) : Functional Image
- second_image (command line option -inp2) : Mask Image

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- usemask : Use Mask Image. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- globalmean : Remove Volume Mean instead of Slice Mean. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: isabella.murphy@yale.edu, xilin.shen@yale.edu.

4.8 Temporal Drift Removal (bis_removetemporaldrift)

Description: bis_removetemporaldrift.tcl – Correct the drift of an image.

Synopsis: bis_removetemporaldrift.tcl [--inp] [--inp2] [--out] [--order]
 [--usemask] [--legendre] [--global] [--dogui] [--pset]
 [--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave]
 [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold]
 [--ctestgui]

Detailed Description: bis_removetemporaldrift.tcl Correct the drift of an image. User can choose to use Legendre polynomial or regular polynomial function to remove the drift in fMRI time courses.

[Inputs]

- `input_image` (command line option `-inp`) : Functional Image
- `second_image` (command line option `-inp2`) : Mask Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `order` : Order of Drift Polynomial. Default value is "3". Allowed range is from -1 to 6
- `usemask` : Use Mask Image. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `legendre` : Use Legendre Polynomials. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `global` : Global Fit, i.e. assume drift is same for all voxels. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000

- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: isabella.murphy@yale.edu, xilin.shen@yale.edu.

4.9 Temporal Smooth (bis_temporalsmoothimage)

Description: `bis_temporalsmoothimage.tcl` – Temporal smoothing with Gaussian kernel.

Synopsis: `bis_temporalsmoothimage.tcl` [--inp] [--inp2] [--out] [--blursigma]
[--usemask] [--dogui] [--pset] [--slicermode] [--loni]
[--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
[--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_temporalsmoothimage.tcl` Temporal smoothing with Gaussian kernel. Time courses are convolved with a Gaussian kernel with specified width.

[Inputs]

- `input_image` (command line option `-inp`) : Functional Image
- `second_image` (command line option `-inp2`) : Mask Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `blursigma` : kernel sigma (gaussian) in frames. Default value is "2.0". Allowed range is from 0 to 5
- `usemask` : Use Mask Image. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: isabella.murphy@yale.edu, xilin.shen@yale.edu.

Chapter 5

Image Processing Dual

5.1 Bias Field (bis_biasfield)

Description: bis_biasfield.tcl – corrects bias field

Synopsis: bis_biasfield.tcl [--inp] [--inp2] [--out] [--out2]
[--initmode] [--mode] [--numclasses] [--resolution] [--maxsigmaratio]
[--minb1] [--maxb1] [--usemask] [--dogui] [--pset]
[--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave]
[--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold]
[--ctestgui]

Detailed Description: bis_biasfield.tcl corrects bias field uses either simple linear inhomogeneity model algorithm or PABIC's algorithm

[Inputs]

- input_image (command line option -inp) : Input Image
- second_image (command line option -inp2) : Mask Image

[Outputs]

- output_image (command line option -out) : Output Image
- bias_field_image (command line option -out2) : Bias Field Estimate

[Options]

- initmode : Preprocessing mode, none, slice or triple slice. Default value is "None". Allowed values = [None, Slice, TripleSlice]

- mode : Fitting Mode either None, Quadratic or Cubic. Default value is "Quadratic". Allowed values = [None, Quadratic, Cubic]
- numclasses : Number of classes = number of tissue labels (background is a tissue label so add this) for polynomial. Default value is "3". Allowed range is from 2 to 10
- resolution : resolution sampling for polynomial estimation . Default value is "3". Allowed range is from 1 to 5
- maxsigmaratio : The program assumes this as the ratio of the max standard deviation to the min standard deviation. This helps the program to prevent from detecting false peak from the histogram.. Default value is "0.2". Allowed range is from 0.1 to 1.0
- minb1 : The program assumes this as the minimum value of the field B1 . Default value is "0.2". Allowed range is from 0.1 to 0.95
- maxb1 : The program assumes this as the maximum value of the field B1 . Default value is "5.0". Allowed range is from 1.1 to 10.0
- usemask : Use Mask Image. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".

- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_biasfield.tcl`. The default output filename was `***_pabic` etc, Now you need to specify output filename explicitly.

Authors: `hirohito.okuda@yale.edu`, `xenophon.papademetris.yale.edu`

5.2 Image Blend (`bis_blendimage`)

Description: `bis_blendimage.tcl` – blends an image using one or more transformations.

Synopsis: `bis_blendimage.tcl` `--inp` `]` `--inp2` `]` `--inp3` `]` `--out` `]`
`--interp` `]` `--background` `]` `--blend` `]` `--guiautoupdate` `]` `--dogui` `]`
`--pset` `]` `--slicermode` `]` `--loni` `]` `--ctest` `]` `--ctestline` `]`
`--ctestsave` `]` `--ctesttmpdir` `]` `--ctestexact` `]` `--ctestthr` `]` `--ctestdebug` `]`
`--ctestcreategold` `]` `--ctestgui` `]`

Detailed Description: `bis_blendimage.tcl` blends an image using one or more transformations. a useful check of the quality of the transformations

[Inputs]

- `input_image` (command line option `-inp`) : Input Image
- `second_image` (command line option `-inp2`) : Overlay Image
- `transformation` (command line option `-inp3`) : Transformation

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `interp` : Interpolation Mode that is used when reslicing the image. Default value is "Linear". Allowed values = [NearestNeighbor, Linear, Cubic]
- `background` : Background Level used to fill voxels outside of mapped area. Default value is "0.0". Allowed range is from -100000 to 100000
- `blend` : Weight (between 0 and 100) of target image. Default value is "50.0". Allowed range is from 0.0 to 100.0

[Common Options]

- **dogui** : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **pset** : Use Parameter set to set parameters. Default value is "".
- **slicermode** : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **loni** : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- **ctest** : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from pxmat_blendimage.tcl.

Authors: hirohito.okuda@yale.edu, xenophon.papademetris@yale.edu.

5.3 CheckerBoard (bis_checkerboardimage)

Description: bis_checkerboardimage.tcl – Creates checkerboard image

Synopsis: `bis_checkerboardimage.tcl` [--inp] [--inp2] [--inp3] [--out]
[--interp] [--spacing] [--background] [--normalizeimages] [--dogui]
[--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
[--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]
[--ctestcreategold] [--ctestgui]

Detailed Description: `bis_checkerboardimage.tcl` Creates checkerboard image a useful check of the quality of the transformations

[Inputs]

- `input_image` (command line option `-inp`) : Input Image
- `second_image` (command line option `-inp2`) : Overlay Image
- `transformation` (command line option `-inp3`) : Transformation

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `interp` : Interpolation Mode that is used when reslicing the image. Default value is "Linear". Allowed values = [NearestNeighbor, Linear, Cubic]
- `spacing` : Checkerboard spacing. Default value is "12". Allowed values = [2, 5, 8, 10, 11, 16, 23, 32]
- `background` : Background Level used to fill voxels outside of mapped area. Default value is "0.0". Allowed range is from -100000 to 100000
- `normalizeimages` : Normalize images. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_blendimage.tcl`.

Authors: `hirohito.okuda@yale.edu`, `xenophon.papademetris@yale.edu`.

5.4 Color Blend Image (`bis_colorblendimage`)

Description: `bis_colorblendimage.tcl` – Creates colorblend image

Synopsis: `bis_colorblendimage.tcl` `--inp` `[--inp2]` `[--inp3]` `[--out]` `[--mode]` `[--background]` `[--dogui]` `[--pset]` `[--slicermode]` `[--loni]` `[--ctest]` `[--ctestline]` `[--ctestsave]` `[--ctesttmpdir]` `[--ctestexact]` `[--ctestthr]` `[--ctestdebug]` `[--ctestcreategold]` `[--ctestgui]`

Detailed Description: `bis_colorblendimage.tcl` Creates colorblend image a useful check of the quality of the transformations

[Inputs]

- `input_image` (command line option `-inp`) : Input Image
- `second_image` (command line option `-inp2`) : Overlay Image
- `transformation` (command line option `-inp3`) : Transformation

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `mode` : Color Combination to Use. Default value is "RedGreen". Allowed values = [RedGreen, RedBlue, GreenBlue]
- `background` : Background Level used to fill voxels outside of mapped area. Default value is "0.0". Allowed range is from -100000 to 100000

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range

is from 0 to 1

Backward Compatibility Issues: Reimplemented from pxmat_blendimage.tcl.

Authors: hirohito.okuda@yale.edu, xenophon.papademetris@yale.edu.

5.5 Create Image Overlay (bis_createoverlayimage)

Description: bis_createoverlayimage.tcl – createoverlays an image using one or more transformations.

Synopsis: bis_createoverlayimage.tcl [--inp] [--inp2] [--inp3] [--out]
 [--out2] [--otype] [--colormap] [--minth] [--maxth]
 [--inh] [--clustersize] [--origvoxels] [--normanat] [--interp]
 [--singframe] [--frame] [--oneconnected] [--guisbar] [--guireslice]
 [--guilateral] [--dogui] [--pset] [--slicermode] [--loni]
 [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
 [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_createoverlayimage.tcl createoverlays an image using one or more transformations. a useful check of the quality of the transformations

[Inputs]

- input_image (command line option -inp) : Input Image
- second_image (command line option -inp2) : Overlay Image
- transformation (command line option -inp3) : Transformation

[Outputs]

- output_image (command line option -out) : Output Image
- resliced_tmap (command line option -out2) : Resliced Output Image

[Options]

- otype : Overlay Type, select which part of the functional image is used . Default value is "Both". Allowed values = [Positive, Negative, Both]
- colormap : Select the colormap needed for this overlay F1 (anat=0.55,func=56.63) F2(anat=0.191,func=192:255), F4=(anat=0.237,func=239:255). Default value is "F1". Allowed values = [F1, F2, F4]
- minth : Lower Threshold value for functional image. Default value is "0.0". Allowed range is from -100000000.0 to 100000000.0

- **maxth** : Upper Threshold value for functional image. Default value is "100.0". Allowed range is from -100000000.0 to 100000000.0
- **inth** : Intensity Threshold value – used to mask overlay if base image is lower than this. Default value is "5.0". Allowed range is from 0.0 to 255.0
- **clustersize** : Cluster Threshold Value. Default value is "0". Allowed range is from 0 to 100000000
- **origvoxels** : Use Voxel size in Functional Image (before reslicing) to determine clustersize. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **normanat** : Intensity Normalize Anatomical Image prior to overlay. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **interp** : Interpolation Mode that is used when reslicing the functional image. Default value is "Linear". Allowed values = [NearestNeighbor, Linear, Cubic]
- **singframe** : Use Single frame from Functional Image to create overlay. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **frame** : Specify frame to use in case of single frame overlay. Default value is "1". Allowed range is from 1 to 1000
- **oneconnected** : Use 1-Connected Clustering. Default value is "1". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- **dogui** : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **pset** : Use Parameter set to set parameters. Default value is "".
- **slicermode** : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **loni** : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- **ctest** : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)

- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_createoverlayimage.tcl`.

Authors: `hirohito.okuda@yale.edu`, `xenophon.papademetris@yale.edu`.

5.6 CSF WM Motion Correction (`bis_csfwmotioncorr`)

Description: `bis_csfwmotioncorr.tcl` – Preprocessing: remove artifacts from cerebrospinal fluid, brain white matter and motion correction.

Synopsis: `bis_csfwmotioncorr.tcl` `--inp` `--inp2` `--out` `--filename` `--domotion` `--docsfwm` `--usemask` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_csfwmotioncorr.tcl` Preprocessing: remove artifacts from cerebrospinal fluid, brain white matter and motion correction. This takes a time series, a segmentation map and motion parameters and removes components parallel to csf/white matter timecourses and motion parameters.

[Inputs]

- `input_image` (command line option `-inp`) : Functional Image
- `second_image` (command line option `-inp2`) : Mask Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `filename` : matlab motion file name. Default value is "".

- domotion : Motion Corr Only. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- docsfwmm : Correct CSF and White Matter. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- usemask : Use Mask Image. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: isabella.murphy@yale.edu, xilin.shen@yale.edu.

5.7 Compute FDR (bis_fdr)

Description: bis_fdr.tcl – Compute False Detection Rate.

Synopsis: bis_fdr.tcl [--inp] [--inp2] [--out] [--inptype]
[--usemask] [--autoscale] [--scaleFactor] [--dof] [--q]
[--guiout] [--dogui] [--pset] [--slicermode] [--loni]
[--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
[--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_fdr.tcl Compute False Detection Rate. An approach to control the expected proportion of false positives. Takes p-values and a FDR rate, and returns a p-value thresholds.

[Inputs]

- input_image (command line option -inp) : Functional Image
- second_image (command line option -inp2) : Mask Image

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- inptype : Data type of input. Default value is "t". Allowed values = [t, z, p, 1-p]
- usemask : Use Mask. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- autoscale : Detect Whether t-values are scaled by 1000 or not. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- scaleFactor : Scale factor . Default value is "1.0". Allowed range is from -100000000.0 to 100000000.0
- dof : Degree of Freedom. Default value is "1". Allowed range is from .0 to 100000000
- q : FDR bound . Default value is "0.01". Allowed range is from 0.0 to 1.0

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

- **loni** : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- **ctest** : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: isabella.murphy@yale.edu, xilin.shen@yale.edu.

5.8 Compute Image Comparison (bis_imagecompare)

Description: bis_imagecompare.tcl – Add, Subtract, Multiply or Divide two images to give an output. NormalT and PairedT assumed 4D Images and perform t-test comparisons

Synopsis: bis_imagecompare.tcl [--inp] [--inp2] [--inp3] [--inp4]
 [--out] [--n1] [--n2] [--scale] [--dogui]
 [--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
 [--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]

`[--ctestcreategold ] [--ctestgui ]`

Detailed Description: `bis_imagecompare.tcl` Add, Subtract, Multiply or Divide two images to give an output. NormalT and PairedT assumed 4D Images and perform t-test comparisons

[Inputs]

- `input_image` (command line option `-inp`) : Mean Image 1
- `second_image` (command line option `-inp2`) : Mean Image 2
- `first_sigma` (command line option `-inp3`) : Standard Deviation 1
- `second_sigma` (command line option `-inp4`) : Standard Deviation 2

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `n1` : Number of Samples for data set 1 (Mean 1, and Sigma 1). Default value is "2". Allowed range is from 1 to 20000
- `n2` : Number of Samples for data set 2 (Mean 2, and Sigma 2). Default value is "1". Allowed range is from 1 to 20000
- `scale` : Scale Factor to multiply resulting t by (typically 1000). Default value is "1000". Allowed range is from 1 to 1000

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: alark.joshi@yale.edu, xenophon.papademetris@yale.edu.

5.9 Math Operations (bis_imagemathoperations)

Description: `bis_imagemathoperations.tcl` – Add, Subtract, Multiply or Divide two images to give an output.

Synopsis: `bis_imagemathoperations.tcl` [--inp] [--inp2] [--inp3] [--out]
 [--interp] [--background] [--mathoperation] [--interthr] [--intermode]
 [--dogui] [--pset] [--slicermode] [--loni] [--ctest]
 [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr]
 [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_imagemathoperations.tcl` Add, Subtract, Multiply or Divide two images to give an output.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image
- `second_image` (command line option `-inp2`) : Overlay Image
- `transformation` (command line option `-inp3`) : Transformation

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- **interp** : Interpolation Mode that is used when reslicing the image. Default value is "Linear". Allowed values = [NearestNeighbor, Linear, Cubic]
- **background** : Background Level used to fill voxels outside of mapped area. Default value is "0.0". Allowed range is from -100000 to 100000
- **mathoperation** : Pick math operation. Default value is "Add". Allowed values = [Add, Subtract, Multiply, Divide, Intersection]
- **interthr** : Threshold for intersection Operation. Default value is "0.0". Allowed range is from -100000000.0 to 100000000.0
- **intermode** : Type of Intersection mode. Default value is "Positive". Allowed values = [Positive, Negative, Both]

[Common Options]

- **dogui** : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **pset** : Use Parameter set to set parameters. Default value is "".
- **slicermode** : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **loni** : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- **ctest** : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999

- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: alark.joshi@yale.edu, xenophon.papademetris@yale.edu.

5.10 Manual Reslice (bis_manualreslice)

Description: `bis_manualreslice.tcl` – reslices an image using one or more transformations.

Synopsis: `bis_manualreslice.tcl` `--inp` `]` `--out` `]` `--rotx` `]` `--roty` `]`
`--rotz` `]` `--interp` `]` `--background` `]` `--dogui` `]` `--pset` `]`
`--slicermode` `]` `--loni` `]` `--ctest` `]` `--ctestline` `]` `--ctestsave` `]`
`--ctesttmpdir` `]` `--ctestexact` `]` `--ctestthr` `]` `--ctestdebug` `]` `--ctestcreategold` `]`
`--ctestgui` `]`

Detailed Description: `bis_manualreslice.tcl` reslices an image using one or more transformations.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `rotx` : Custom Rotation of image around X-axis. Default value is "0.0". Allowed range is from -360.0 to 360.0
- `roty` : Custom Rotation of image around Y-axis. Default value is "0.0". Allowed range is from -360.0 to 360.0
- `rotz` : Custom Rotation of image around Z-axis. Default value is "0.0". Allowed range is from -360.0 to 360.0
- `interp` : Interpolation Mode that is used when reslicing the image. Default value is "Linear". Allowed values = [NearestNeighbor, Linear, Cubic]
- `background` : Background Level used to fill voxels outside of mapped area. Default value is "0.0". Allowed range is from -100000 to 100000

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_manualreslice.tcl`.

Authors: `hirohito.okuda@yale.edu`, `xenophon.papademetris@yale.edu`.

5.11 Mask Image (`bis_maskimage`)

Description: `bis_maskimage.tcl` – blends an image using one or more transformations.

Synopsis: `bis_maskimage.tcl` [--inp] [--inp2] [--inp3] [--out]
[--interp] [--maskdilation] [--background] [--dogui] [--pset]
[--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave]
[--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold]
[--ctestgui]

Detailed Description: `bis_maskimage.tcl` blends an image using one or more transformations. a useful check of the quality of the transformations

[Inputs]

- `input_image` (command line option `-inp`) : Input Image
- `second_image` (command line option `-inp2`) : Overlay Image
- `transformation` (command line option `-inp3`) : Transformation

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `interp` : Interpolation Mode that is used when reslicing the image. Default value is "Linear". Allowed values = [NearestNeighbor, Linear, Cubic]
- `maskdilation` : Dilate binary mask prior to masking. Default value is "0". Allowed values = [0, 1, 2, 3, 4, 5]
- `background` : Background Level used to fill voxels outside of mapped area. Default value is "0.0". Allowed range is from -100000 to 100000

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999

- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_maskimage.tcl`.

Authors: `hirohito.okuda@yale.edu`, `xenophon.papademetris@yale.edu`.

5.12 Image Reslice (`bis_resliceimage`)

Description: `bis_resliceimage.tcl` – reslices an image using one or more transformations.

Synopsis: `bis_resliceimage.tcl` `--inp` `]` `--inp2` `]` `--inp3` `]` `--inp4` `]`
`--inp5` `]` `--out` `]` `--interp` `]` `--background` `]` `--dogui` `]`
`--pset` `]` `--slicermode` `]` `--loni` `]` `--ctest` `]` `--ctestline` `]`
`--ctestsave` `]` `--ctesttmpdir` `]` `--ctestexact` `]` `--ctestthr` `]` `--ctestdebug` `]`
`--ctestcreategold` `]` `--ctestgui` `]`

Detailed Description: `bis_resliceimage.tcl` reslices an image using one or more transformations.

[Inputs]

- `input_image` (command line option `-inp`) : Reference Image
- `second_image` (command line option `-inp2`) : Transform Image
- `transformation` (command line option `-inp3`) : Transformation
- `xform2` (command line option `-inp4`) : Transformation 2
- `xform3` (command line option `-inp5`) : Transformation 3

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- interp : Interpolation Mode that is used when reslicing the image. Default value is "Linear". Allowed values = [NearestNeighbor, Linear, Cubic]
- background : Background Level used to fill voxels outside of mapped area. Default value is "0.0". Allowed range is from -100000 to 100000

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range

is from 0 to 1

Backward Compatibility Issues: Reimplemented from pxmat_resliceimage.tcl.

Authors: hirohito.okuda@yale.edu, xenophon.papademetris@yale.edu.

5.13 ROI Mean (bis_roimean)

Description: bis_roimean.tcl – Calculate the mean time course of each ROI defined by ROI mask.

Synopsis: bis_roimean.tcl [--inp] [--inp2] [--out] [--dotextfile]
[--filename] [--addregion] [--fullsizeoutput] [--dogui] [--pset]
[--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave]
[--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold]
[--ctestgui]

Detailed Description: bis_roimean.tcl Calculate the mean time course of each ROI defined by ROI mask. This algorithm requires two inputs, one is a brain 4D image, the other is the ROI 3D image for this brain image. This algorithm returns a 4D image of ROI mean and can also output a text file.

[Inputs]

- input_image (command line option -inp) : Functional Image
- second_image (command line option -inp2) : ROI Image

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- dotextfile : Generate output text file. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- filename : specify the filename for the output text file. Default value is "roimean_result.txt".
- addregion : Add extra roi region. Default value is "0". Allowed range is from 0 to 100
- fullsizeoutput : Generate Full Size Output Image. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: isabella.murphy@yale.edu, xilin.shen@yale.edu.

5.14 Math Operations (bis_singleimagemathoperations)

Description: bis_singleimagemathoperations.tcl – Image to Image algorithm that does more complex operations than bis_imagemathoperations

Synopsis: `bis_singleimagemathoperations.tcl` `--inp` `--out` `--mathoperation` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_singleimagemathoperations.tcl` Image to Image algorithm that does more complex operations than `bis_imagemathoperations` Invert, Exp, Log, Sin, Cos of an image to give an output.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `mathoperation` : Pick math operation. Default value is "Invert". Allowed values = [Invert, Absolute, Exp, Log, Sin, Cos]

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".

- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: alark.joshi@yale.edu, xenophon.papademetris@yale.edu.

5.15 Slice Inhomogeneity (`bis_sliceinhomogeneity`)

Description: `bis_sliceinhomogeneity.tcl` – corrects slice inhomogeneity correction for MRI acquisitions.

Synopsis: `bis_sliceinhomogeneity.tcl` `--inp` `]` `--out` `]` `--dotriple` `]` `--dogui` `]`
`--pset` `]` `--slicermode` `]` `--loni` `]` `--ctest` `]` `--ctestline` `]`
`--ctestsave` `]` `--ctesttmpdir` `]` `--ctestexact` `]` `--ctestthr` `]` `--ctestdebug` `]`
`--ctestcreategold` `]` `--ctestgui` `]`

Detailed Description: `bis_sliceinhomogeneity.tcl` corrects slice inhomogeneity correction for MRI acquisitions. Single slice is default, triple slice is useful as a crude bias field correction for high field acquisitions.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- **dotriple** : if off do slice else tripleslice. When dotriple is off, the algorithm computes inhomogeneity along the slice direction, else this is computed for all three axis. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- **dogui** : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **pset** : Use Parameter set to set parameters. Default value is "".
- **slicermode** : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **loni** : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- **ctest** : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from pxmat_biasfield.tcl.

Authors: hirohito.okuda@yale.edu,xenophon.papademetris.yale.edu

5.16 Stitch images (bis_stitchimage)

Description: bis_stitchimage.tcl – Stitches images

Synopsis: bis_stitchimage.tcl [--inp] [--inp2] [--inp3] [--out]
[--interp] [--axis] [--seam] [--flip] [--pad]
[--dogui] [--pset] [--slicermode] [--loni] [--ctest]
[--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr]
[--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_stitchimage.tcl Stitches images

[Inputs]

- input_image (command line option -inp) : Input Image
- second_image (command line option -inp2) : Overlay Image
- transformation (command line option -inp3) : Transformation

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- interp : Interpolation Mode that is used when reslicing the image. Default value is "Linear". Allowed values = [NearestNeighbor, Linear, Cubic]
- axis : Stitching Axis. Default value is "X". Allowed values = [X, Y, Z]
- seam : Seam. Default value is "-1". Allowed range is from -1 to 256
- flip : Flip. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pad : Pad. Default value is "0". Allowed range is from 0 to 10

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_blendimage.tcl`.

Authors: `alark.joshi@yale.edu`, `xenophon.papademetris@yale.edu`.

5.17 Compute T-Test (`bis_ttest`)

Description: `bis_ttest.tcl` – t test.

Synopsis: `bis_ttest.tcl` `--inp` `]` `--inp2` `]` `--out` `]` `--mode` `]`
`--dogui` `]` `--pset` `]` `--slicermode` `]` `--loni` `]` `--ctest` `]`
`--ctestline` `]` `--ctestsave` `]` `--ctesttmpdir` `]` `--ctestexact` `]` `--ctestthr` `]`
`--ctestdebug` `]` `--ctestcreategold` `]` `--ctestgui` `]`

Detailed Description: `bis_ttest.tcl` t test. takes two inputs and computes either a paired t-test or an unpaired t-test or a single group t-test. For paired t-test both images must have the same number of frames.

[Inputs]

- `input_image` (command line option `-inp`) : DataSet 1
- `second_image` (command line option `-inp2`) : DataSet 2

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- mode : Type of T Test. Default value is "paired". Allowed values = [paired, unpaired, singlegroup]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: isabella.murphy@yale.edu

Chapter 6

Image Processing Multiple

6.1 Combine Set of Images (bis_combineimages)

Description: `bis_combineimages.tcl` – Takes in a set of 3d images and creates a 3d mean, maximum, sum or minimum

Synopsis: `bis_combineimages.tcl` `--out` `--mode` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`
`input_image1 input_image2 ... input_imageN`

Detailed Description: `bis_combineimages.tcl` Takes in a set of 3d images and creates a 3d mean, maximum, sum or minimum

[Inputs]

- `input_image` list – specify the list of names for this at the end of the command line

[Outputs]

- `output_image` (command line option `-out`) : output 4d image

[Options]

- `mode` : Method to combine images. Default value is "Mean". Allowed values = [Mean, Sum, Max, Min, Median]

[Common Options]

- **dogui** : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **pset** : Use Parameter set to set parameters. Default value is "".
- **slicermode** : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **loni** : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- **ctest** : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxaverageimages.tcl`, with extra features.

Authors:

6.2 Concatenate Set of 3D Images (`bis_create4dimage`)

Description: `bis_create4dimage.tcl` – combines a number of 3D volumes into a single 4D image.

Synopsis: `bis_create4dimage.tcl` `--out` `--guicmt` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`
`input_image1 input_image2 ... input_imageN`

Detailed Description: `bis_create4dimage.tcl` combines a number of 3D volumes into a single 4D image. Output filename is `image1_4D.hdr` (or `image1_4D.nifti`)

[Inputs]

- `input_image` list – specify the list of names for this at the end of the command line

[Outputs]

- `output_image` (command line option `-out`) : output 4d image

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000

- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from pxmat_create4dimage.tcl.

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Chapter 7

Surface Processing

7.1 Clean Surface (bis_cleansurface)

Description: bis_cleansurface.tcl – smooths a surface

Synopsis: bis_cleansurface.tcl [--inp] [--out] [--cleanTolerance] [--cleanMethod]
[--dogui] [--pset] [--slicermode] [--loni] [--ctest]
[--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr]
[--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_cleansurface.tcl smooths a surface

[Inputs]

- input_surface (command line option -inp) : Input Surface

[Outputs]

- output_surface (command line option -out) : Output Surface

[Options]

- cleanTolerance : Specify the tolerance for the cleansurface algorithm. Default value is "0.1". Allowed range is from 0.0 to 20.0
- cleanMethod : Pick a smoothing method: Distance Sampling or Quadric Clustering. . Default value is "Distance_Sampling". Allowed values = [Distance_Sampling, Quadric_Clustering]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: alark.joshi@yale.edu

7.2 Clip Surface (bis_clipsurface)

Description: bis_clipsurface.tcl – Clip polygonal data with user-specified implicit function or input scalar data

Synopsis: `bis_clipsurface.tcl` [--inp] [--inp2] [--out] [--lowthreshold]
[--highthreshold] [--dogui] [--pset] [--slicermode] [--loni]
[--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
[--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_clipsurface.tcl` Clip polygonal data with user-specified implicit function or input scalar data

[Inputs]

- `input_surface` (command line option `-inp`) : Input Surface
- `input_image` (command line option `-inp2`) : Input Image

[Outputs]

- `output_surface` (command line option `-out`) : Output Surface

[Options]

- `lowthreshold` : Low Threshold. Default value is "0.0". Allowed range is from 0.0 to 1096.0
- `highthreshold` : High Threshold. Default value is "255.0". Allowed range is from 0.0 to 1096.0

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".

- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Newly added.

Authors: alark.joshi@yale.edu

7.3 Compute Normals (bis_computenormals)

Description: `bis_computenormals.tcl` – computes normals of a surface

Synopsis: `bis_computenormals.tcl` [--inp] [--out] [--featureangle] [--edgesplit]
 [--flipnormals] [--dogui] [--pset] [--slicermode] [--loni]
 [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
 [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_computenormals.tcl` computes normals of a surface

[Inputs]

- `input_surface` (command line option `-inp`) : Input Surface

[Outputs]

- `output_surface` (command line option `-out`) : Output Surface

[Options]

- `featureangle` : Feature angle between 0 to 180 degrees. Default value is "90.0". Allowed range is from 0.0 to 180.0
- `edgesplit` : Edge Splitting. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `flipnormals` : Flip normals. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- **dogui** : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **pset** : Use Parameter set to set parameters. Default value is "".
- **slicermode** : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **loni** : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- **ctest** : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: alark.joshi@yale.edu

7.4 Connect (bis_connect)

Description: bis_connect.tcl – Extract polygonal data based on geometric connectivity

Synopsis: `bis_connect.tcl` [--inp] [--out] [--connectType] [--nx]
 [--ny] [--nz] [--dogui] [--pset] [--slicermode]
 [--loni] [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir]
 [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_connect.tcl` Extract polygonal data based on geometric connectivity takes a surface as an input

[Inputs]

- `input_surface` (command line option `-inp`) : Input Surface

[Outputs]

- `output_surface` (command line option `-out`) : Output Surface

[Options]

- `connectType` : Connect Largest Region or Nearest Point. Default value is "Largest_Region". Allowed values = [Largest_Region, Nearest_Point]
- `nx` : X-coordinate of Nearest Point. Default value is "1.0". Allowed range is from 0.0 to 500.0
- `ny` : Y-coordinate of Nearest Point. Default value is "1.0". Allowed range is from 0.0 to 500.0
- `nz` : Z-coordinate of Nearest Point. Default value is "1.0". Allowed range is from 0.0 to 500.0

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Newly added.

Authors: alark.joshi@yale.edu

7.5 Curvatures (bis_curvatures)

Description: `bis_curvatures.tcl` – computes curvatures of a surface

Synopsis: `bis_curvatures.tcl` [--inp] [--out] [--ctype] [--dogui]
[--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
[--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]
[--ctestcreategold] [--ctestgui]

Detailed Description: `bis_curvatures.tcl` computes curvatures of a surface curvature can be either gaussian curvature or mean curvature

[Inputs]

- `input_surface` (command line option `-inp`) : Input Surface

[Outputs]

- `output_surface` (command line option `-out`) : Output Surface

[Options]

- ctype : gaussian: Gaussian curvature , mean:Mean curvature . Default value is "gaussian". Allowed values = [mean, gaussian]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: alark.joshi@yale.edu

7.6 Decimate (bis_decimate)

Description: bis_decimate.tcl – decimate a surface

Synopsis: bis_decimate.tcl [--inp] [--out] [--decimatefactor] [--preserveTopology]
[--dogui] [--pset] [--slicermode] [--loni] [--ctest]
[--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr]
[--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_decimate.tcl decimate a surface takes in a surface and returns a surface with less points

[Inputs]

- input_surface (command line option -inp) : Input Surface

[Outputs]

- output_surface (command line option -out) : Output Surface

[Options]

- decimatefactor : Specify the desired reduction in the total number of polygons.. Default value is "0.2". Allowed range is from 0.0 to 1.0
- preserveTopology : Turn on/off whether to preserve the topology of the original mesh. If on, mesh splitting and hole elimination will not occur. This may limit the maximum reduction that may be achieved.. Default value is "On". Allowed values = [On, Off]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed

range is from -1 to 9999

- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: alark.joshi@yale.edu

7.7 Delaunay Triangulation (bis_delaunay3D)

Description: `bis_delaunay3D.tcl` – Delaunay triangulation of a surface

Synopsis: `bis_delaunay3D.tcl` `--inp` `--out` `--merging` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_delaunay3D.tcl` Delaunay triangulation of a surface

[Inputs]

- `input_surface` (command line option `--inp`) : Input Surface

[Outputs]

- `output_surface` (command line option `--out`) : Output Surface

[Options]

- merging : Turn on/off merging of coincident points. Note that is merging is on, points with different point attributes (e.g., normals) are merged, which may cause rendering artifacts.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: alark.joshi@yale.edu

7.8 Extract Objectmap (bis_extractobjectmap)

Description: bis_extractobjectmap.tcl – Extract a surface from an objectmap (image)

Synopsis: bis_extractobjectmap.tcl [--inp] [--out] [--lowthreshold] [--hightreshold]
[--smoothingxy] [--smoothingz] [--resample] [--dogui] [--pset]
[--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave]
[--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold]
[--ctestgui]

Detailed Description: bis_extractobjectmap.tcl Extract a surface from an objectmap (image)

[Inputs]

- input_image (command line option -inp) : Input Image

[Outputs]

- output_surface (command line option -out) : Output Surface

[Options]

- lowthreshold : Low Threshold. Default value is "0.0". Allowed range is from 0.0 to 255.0
- hightreshold : High Threshold. Default value is "255.0". Allowed range is from 0.0 to 255.0
- smoothingxy : Smoothing XY 1-4. Default value is "0.0". Allowed values = [0.0, 1.0, 2.0, 3.0, 4.0]
- smoothingz : Smoothing Z 1-4. Default value is "0.0". Allowed values = [0.0, 1.0, 2.0, 3.0, 4.0]
- resample : Resample scale 1-4. Default value is "1.0". Allowed values = [1.0, 2.0, 3.0, 4.0]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions.

Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: alark.joshi@yale.edu

7.9 Extract Surface (bis_extractsurface)

Description: bis_extractsurface.tcl – Extract a surface from an image

Synopsis: bis_extractsurface.tcl [--inp] [--out] [--smoothing] [--smoothscale]
 [--resample] [--resamplescale] [--thresholding] [--extractLevel] [--lowthreshold]
 [--hightreshold] [--dogui] [--pset] [--slicermode] [--loni]
 [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
 [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_extractsurface.tcl Extract a surface from an image

[Inputs]

- input_image (command line option `-inp`) : Input Image

[Outputs]

- output_surface (command line option `-out`) : Output Surface

[Options]

- smoothing : Pick smoothing On/Off. . Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- smoothscale : Smoothing scale. Default value is "1.0". Allowed range is from 0.25 to 6.0
- resample : Resample On/Off. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- resamplescale : Resample scale. Default value is "2.0". Allowed range is from 1.0 to 6.0
- thresholding : Perform Thresholding. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- extractLevel : Extract Level. Default value is "128.0". Allowed range is from 0.0 to 255.0
- lowthreshold : Low Threshold. Default value is "0.0". Allowed range is from 0.0 to 255.0
- highthreshold : High Threshold. Default value is "255.0". Allowed range is from 0.0 to 255.0

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value

is "1". Allowed values are either 0 (Off) or 1 (On)

- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: alark.joshi@yale.edu

7.10 Smooth Surface (bis_smoothsurface)

Description: bis_smoothsurface.tcl – smoothing a surface

Synopsis: bis_smoothsurface.tcl [--inp] [--out] [--iterations] [--relaxationfactor]
[--smoothBoundary] [--smoothMethod] [--dogui] [--pset] [--slicermode]
[--loni] [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir]
[--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_smoothsurface.tcl smoothing a surface

[Inputs]

- input_surface (command line option -inp) : Input Surface

[Outputs]

- output_surface (command line option -out) : Output Surface

[Options]

- iterations : Number of iterations for smoothing. Default value is "5". Allowed range is from 0 to 200
- relaxationfactor : Specify the relaxation factor for Laplacian smoothing. Default value is "0.2". Allowed range is from 0.0 to 1.0
- smoothBoundary : Turn on/off the smoothing of vertices on the boundary of the mesh. . Default value is "0". Allowed values are either 0 (Off) or 1 (On)

- smoothMethod : Pick a smoothing method: Laplacian or Windowed Sinc. . Default value is "Laplacian". Allowed values = [Laplacian, Windowed_Sinc]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: alark.joshi@yale.edu

7.11 Subdivide (bis_subdivide)

Description: bis_subdivide.tcl – subdividing a surface

Synopsis: bis_subdivide.tcl [--inp] [--out] [--numberOfSubdivisions] [--dogui]
[--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
[--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]
[--ctestcreategold] [--ctestgui]

Detailed Description: bis_subdivide.tcl subdividing a surface

[Inputs]

- input_surface (command line option --inp) : Input Surface

[Outputs]

- output_surface (command line option --out) : Output Surface

[Options]

- numberOfSubdivisions : Number of Subdivisions. Default value is "1". Allowed range is from 1 to 10

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: alark.joshi@yale.edu

7.12 Threshold points (bis_thresholdpoints)

Description: `bis_thresholdpoints.tcl` – Extract a surface from an image

Synopsis: `bis_thresholdpoints.tcl` [--inp] [--out] [--thresholdMethod] [--lowthreshold]
[--highthreshold] [--dogui] [--pset] [--slicermode] [--loni]
[--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
[--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_thresholdpoints.tcl` Extract a surface from an image

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_surface` (command line option `-out`) : Output Surface

[Options]

- `thresholdMethod` : Thresholding method. Default value is "Below_Lower". Allowed values = [Below_Lower, Above_Higer, Between]
- `lowthreshold` : Low Threshold. Default value is "0.0". Allowed range is from 0.0 to 255.0
- `hightreshold` : High Threshold. Default value is "255.0". Allowed range is from 0.0 to 255.0

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: alark.joshi@yale.edu

7.13 Transform Surface (bis_transformsurface)

Description: bis_transformsurface.tcl – Transforms (warps) a surface using a transformation

Synopsis: bis_transformsurface.tcl [--inp] [--inp2] [--out] [--guicmt2]
[--dogui] [--pset] [--slicermode] [--loni] [--ctest]
[--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr]
[--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_transformsurface.tcl Transforms (warps) a surface using a transformation

[Inputs]

- input_surface (command line option -inp) : Input Surface
- transformation (command line option -inp2) : Transformation

[Outputs]

- output_surface (command line option -out) : Output Surface

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".

- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: hirohito.okuda@yale.edu

7.14 Triangulate (bis_triangulate)

Description: `bis_triangulate.tcl` – triangulate a surface

Synopsis: `bis_triangulate.tcl` [--inp] [--out] [--computeNormals] [--featureangle] [--edgesplit] [--flipnormals] [--dogui] [--pset] [--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_triangulate.tcl` triangulate a surface

[Inputs]

- `input_surface` (command line option `-inp`) : Input Surface

[Outputs]

- `output_surface` (command line option `-out`) : Output Surface

[Options]

- `computeNormals` : Turn normal computation on/off . Default value is "On". Allowed values = [On, Off]
- `featureangle` : Feature angle between 0 to 180 degrees. Default value is "90.0". Allowed range is from 0.0 to 180.0

- edgesplit : Edge Splitting. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- flipnormals : Flip normals. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: alark.joshi@yale.edu

Chapter 8

Registration

8.1 Combine Transformations (`bis_combinettransformations`)

Description: `bis_combinettransformations.tcl` – computes a combined (optionally inverse) transformation for a set transformation given an image to define the space.

Synopsis: `bis_combinettransformations.tcl` `--inp` `--inp2` `--inp3` `--inp4` `--inp5` `--out` `--out2` `--inverse` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_combinettransformations.tcl` computes a combined (optionally inverse) transformation for a set transformation given an image to define the space.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image
- `transformation` (command line option `-inp2`) : Transformation 1
- `xform2` (command line option `-inp3`) : Transformation 2
- `xform3` (command line option `-inp4`) : Transformation 3
- `second_image` (command line option `-inp5`) : Unused Second Image

[Outputs]

- `comboxform` (command line option `-out`) : Combined Transformation
- `output_image` (command line option `-out2`) : Combined Disp Field

[Options]

- `inverse` : Create Inverse Transformation. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: hirohito.okuda@yale.edu, xenophon.papademetris@yale.edu.

8.2 Compute Displacement Field (bis_computedisplacementfield)

Description: bis_computedisplacementfield.tcl – computes the displacement field for a transformation given an image to define the space.

Synopsis: bis_computedisplacementfield.tcl [--inp] [--inp2] [--inp3] [--inp4]
[--inp5] [--out] [--guicmt] [--dogui] [--pset]
[--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave]
[--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold]
[--ctestgui]

Detailed Description: bis_computedisplacementfield.tcl computes the displacement field for a transformation given an image to define the space.

[Inputs]

- input_image (command line option -inp) : Input Image
- transformation (command line option -inp2) : Transformation 1
- xform2 (command line option -inp3) : Transformation 2
- xform3 (command line option -inp4) : Transformation 3
- second_image (command line option -inp5) : Unused Second Image

[Outputs]

- output_image (command line option -out) : Output Image

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999

- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_displacementfield.tcl`

Authors: `hirohito.okuda@yale.edu`, `xenophon.papademetris@yale.edu`.

8.3 Compute Overlap (`bis_computeoverlap`)

Description: `bis_computeoverlap.tcl` – computes overlap metrics of the pre-segmented structures after registration.

Synopsis: `bis_computeoverlap.tcl` `--inp` `]` `--inp2` `]` `--inp3` `]` `--out` `]`
`--sigma` `]` `--multioverlap` `]` `--filename` `]` `--saveasimage` `]` `--dogui` `]`
`--pset` `]` `--slicermode` `]` `--loni` `]` `--ctest` `]` `--ctestline` `]`
`--ctestsave` `]` `--ctesttmpdir` `]` `--ctestexact` `]` `--ctestthr` `]` `--ctestdebug` `]`
`--ctestcreategold` `]` `--ctestgui` `]`

Detailed Description: `bis_computeoverlap.tcl` computes overlap metrics of the pre-segmented structures after registration. Computed metrics are $\text{overlap1} = 100 * (\text{intersection}(V1, V2)) / (\text{Union}(V1, V2))$, $\text{overlap2} = 100 * V2 / \text{avarage}(V1, V2)$, where $V1$ is the pre-segmented structure in the reference image and $V2$ is the pre-segmented structure in the target image after transformation. If the transformation is not specified, metrics are computed without transformation.

[Inputs]

- `input_image` (command line option `--inp`) : Reference Objectmap

- second_image (command line option `-inp2`) : Target Objectmap
- transformation (command line option `-inp3`) : Transformation

[Outputs]

- output_image (command line option `-out`) : Output Image

[Options]

- sigma : gaussian standard deviation for smoothing binary image. Default value is "1.0". Allowed range is from 0.0 to 10.0
- multioverlap : Treat Intensity levels as separate objects. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- filename : specify the filename for the output text file. Default value is "".
- saveasimage : If on the output is an image instead of a text file. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000

- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_computeoverlap.tcl`

Authors: alark.joshi@yale.edu, hirohito.okuda@yale.edu, xenophon.papademetris.yale.edu

8.4 Compute Similarity (`bis_computesimilarity`)

Description: `bis_computesimilarity.tcl` – computes image similarity measures between the reference image and the target image after a transform and optionally point distances between the reference surface and the target surface.

Synopsis: `bis_computesimilarity.tcl` `--inp` `--inp2` `--inp3` `--inp4` `--inp5` `--out` `--temperature` `--numpoints` `--matchmode` `--numberofbins` `--mode` `--filename` `--saveasimage` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_computesimilarity.tcl` computes image similarity measures between the reference image and the target image after a transform and optionally point distances between the reference surface and the target surface. Computed metrics for images are Joint Entropy, CR, Gradient Correlation, Mutual Information, Normalized Mutual Information, Sum of Squared Differences, Correlation ratio $C(X-Y)$, Correlation ratio $C(Y-X)$, Product, DifferenceEntropy.

[Inputs]

- `input_image` (command line option `-inp`) : Reference Objectmap
- `second_image` (command line option `-inp2`) : Target Objectmap
- `transformation` (command line option `-inp3`) : Transformation
- `reference_surface` (command line option `-inp4`) : Reference Surface Objectmap
- `target_surface` (command line option `-inp5`) : Target Surface Objectmap

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- temperature : Surface Matching: temperature. Used when matchmode !=0 . Default value is "0". Allowed range is from 0 to 1
- numpoints : Surface Matching: number of points to use for distance computation. Default value is "0". Allowed range is from 0 to 1
- matchmode : Surface Matching: 0 = ICP, 1=Mixture, 2=RPM (Use 0 for nearest neighbor). Default value is "0". Allowed range is from 0 to 1
- numberofbins : Number of bins for the joint histogram. Default value is "64". Allowed range is from 32 to 1024
- mode : Mode (Surface/Image/Both). Default value is "Image". Allowed values = [Image, Surface, Both]
- filename : specify the filename for the output text file. Default value is "".
- saveasimage : If on the output is an image instead of a text file. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".

- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat.computesimilarity.tcl.point` distance computation part should be integrated with `bis.computedistance.tcl`

Authors: `hirohito.okuda@yale.edu`, `xenophon.papademetris.yale.edu`

8.5 Linear Registration (`bis_linearintensityregister`)

Description: `bis_linearintensityregister.tcl` – computes a linear intensity based registrations.

Synopsis: `bis_linearintensityregister.tcl` `--inp` `--inp2` `--inp3` `--inp4` `--inp5` `--out` `--out2` `--mode` `--useinitial` `--resolution` `--stepsize` `--numberoflevels` `--metric` `--iterations` `--resolutionrate` `--autonormalize` `--optimization` `--numberofbins` `--numberofsteps` `--guiautosave` `--reslimage` `--useweightimage` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_linearintensityregister.tcl` computes a linear intensity based registrations.

[Inputs]

- `reference_image` (command line option `-inp`) : Reference Image
- `transform_image` (command line option `-inp2`) : Transform Image
- `initial_transform` (command line option `-inp3`) : Initial Transformation
- `weight_image` (command line option `-inp4`) : Reference Weight Image
- `weight_image2` (command line option `-inp5`) : Transform Weight Image

[Outputs]

- `output_transform` (command line option `-out`) : Output Transformation
- `output_image` (command line option `-out2`) : Transformed Image

[Options]

- mode : Type of linear registration. Default value is "rigid". Allowed values = [rigid, affine, similarity, affine2d, rigid2d, similarity2d]
- useinitial : Use Initial Transformation. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- resolution : resolution . Default value is "1.5". Allowed range is from 0.5 to 10.0
- stepsize : step size . Default value is "1.0". Allowed range is from 0.1 to 5.0
- numberoflevels : number of multiresolution levels. Default value is "3". Allowed range is from 1 to 5
- metric : Similarity Metric. Default value is "NMI". Allowed values = [SSD, CC, MI, NMI, JE]
- iterations : Number of iterations . Default value is "15". Allowed range is from 1 to 50
- resolutionrate : Rate at which to decrease the resolution. Default value is "2". Allowed range is from 1.05 to 3.0
- autonormalize : Autonormalize Intensities (i.e. saturate between 1% and 99% of intensity range). Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- optimization : Optimization Method. Default value is "Default". Allowed values = [default, SlowClimb, GradientDescent, ConjugateGradient, Hybrid]
- numberofbins : Number of bins for the joint histogram. Default value is "64". Allowed range is from 32 to 1024
- numberofsteps : Number of steps/level for the optimization. Default value is "1". Allowed range is from 1 to 5
- reslimage : Output a resliced image, or a red-green blend image, or no resliced image. Default value is "Resliced". Allowed values = [Resliced, ColorBlend]
- useweightimage : Weighted Registrations (0=none,1=ref only,2=both ref and target weights). Default value is "0". Allowed values = [0, 1, 2]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Refactored from `pxmat_register.tcl`.

Authors: `hirohito.okuda@yale.edu`, `xenophon.papademetris.yale.edu`

8.6 Linear RPM (`bis_linearpointregister`)

Description: `bis_linearpointregister.tcl` – computes a linear point based registrations.

Synopsis: `bis_linearpointregister.tcl` `--inp` `]` `--inp2` `]` `--inp3` `]` `--out` `]`
`--out2` `]` `--mode` `]` `--matchmode` `]` `--numpoints` `]` `--tstart` `]`
`--tstop` `]` `--useinitial` `]` `--guiautosave` `]` `--dogui` `]` `--pset` `]`
`--slicermode` `]` `--loni` `]` `--ctest` `]` `--ctestline` `]` `--ctestsave` `]`
`--ctesttmpdir` `]` `--ctestexact` `]` `--ctestthr` `]` `--ctestdebug` `]` `--ctestcreategold` `]`
`--ctestgui` `]`

Detailed Description: `bis_linearpointregister.tcl` computes a linear point based registrations.

[Inputs]

- `reference_surface` (command line option `-inp`) : Reference Surface
- `transform_surface` (command line option `-inp2`) : Transform Surface
- `initial_transform` (command line option `-inp3`) : Initial Transformation

[Outputs]

- `output_transform` (command line option `-out`) : Output Transformation

- output_surface (command line option -out2) : Transformed Surface

[Options]

- mode : Type of linear registration. Default value is "affine". Allowed values = [rigid, affine, similarity]
- matchmode : Match Mode either RPM or ICP. Default value is "rpm". Allowed values = [rpm, icp]
- numpoints : number of points . Default value is "800". Allowed range is from 0 to 10000
- tstart : Initial temperature . Default value is "5.0". Allowed range is from 0.0 to 100.0
- tstop : Final temperature . Default value is "2.0". Allowed range is from 0.0 to 100.0
- useinitial : Use Initial Transformation. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from

0 to 9999

- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Refactored from `pxmat_pointregister.tcl`

Authors: `hirohito.okuda@yale.edu`, `xenophon.papademetris.yale.edu`

8.7 Manual Registration (`bis_manualregistration`)

Description: `bis_manualregistration.tcl` – Computes a manual registration of an image

Synopsis: `bis_manualregistration.tcl` `--inp` `--inp2` `--inp3` `--inp4` `--out` `--out2` `--shiftx` `--shifty` `--shiftz` `--anglex` `--angley` `--anglez` `--scalex` `--scaley` `--scalez` `--usepoints` `--mode` `--reslimage` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_manualregistration.tcl` Computes a manual registration of an image

[Inputs]

- `input_image` (command line option `-inp`) : Reference Image
- `second_image` (command line option `-inp2`) : Transform Image
- `refpoints` (command line option `-inp3`) : Reference Points
- `targpoints` (command line option `-inp4`) : Target Points

[Outputs]

- `output_transform` (command line option `-out`) : Output Transformation
- `output_image` (command line option `-out2`) : Resliced Image

[Options]

- `shiftx` : X-Translation (in voxels). Default value is "0". Allowed range is from -500 to 500
- `shifty` : Y-Translation (in voxels). Default value is "0". Allowed range is from -500 to 500
- `shiftz` : Z-Translation (in voxels). Default value is "0". Allowed range is from -500 to 500
- `anglex` : X-Rotation in degrees. Default value is "0". Allowed range is from -359 to 359
- `angley` : Y-Rotation in degrees. Default value is "0". Allowed range is from -359 to 359

- `anglez` : Z-Rotation in degrees. Default value is "0". Allowed range is from -359 to 359
- `scalex` : X-Scale Factor (percentage 100=identity). Default value is "100". Allowed range is from 20 to 500
- `scaley` : Y-Scale Factor (percentage 100=identity). Default value is "100". Allowed range is from 20 to 500
- `scalez` : Z-Scale Factor (percentage 100=identity). Default value is "100". Allowed range is from 20 to 500
- `usepoints` : If 0 – set transformation manually, otherwise use point sets (which must have the same number of points). Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `mode` : Type of transformation (if using points). Default value is "affine". Allowed values = [rigid, affine, similarity, tps]
- `reslimage` : Output a resliced image, or a red-green blend image, or no resliced image. Default value is "Resliced". Allowed values = [Resliced, ColorBlend]

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from

0 to 9999

- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from GUI code in `pxitcoverlaytool.tcl`.

Authors: `xenophon.papademetris@yale.edu`.

8.8 Distortion Cor (`bis_nonlineardistortioncorrection`)

Description: `bis_nonlineardistortioncorrection.tcl` – Computes non-linear distortion corrections for echoplanar images.

Synopsis: `bis_nonlineardistortioncorrection.tcl` `--inp` `]` `--inp2` `]` `--inp3` `]` `--inp4` `]`
`--inp5` `]` `--out` `]` `--out2` `]` `--initialmode` `]` `--spacing` `]`
`--spacingrate` `]` `--smoothness` `]` `--dir` `]` `--windowsize` `]` `--extralevels` `]`
`--resolution` `]` `--stepsize` `]` `--numberoflevels` `]` `--metric` `]` `--iterations` `]`
`--resolutionrate` `]` `--autonormalize` `]` `--optimization` `]` `--numberofbins` `]` `--numberofsteps` `]`
`--guiautosave` `]` `--reslimage` `]` `--useweightimage` `]` `--dogui` `]` `--pset` `]`
`--slicermode` `]` `--loni` `]` `--ctest` `]` `--ctestline` `]` `--ctestsave` `]`
`--ctesttmpdir` `]` `--ctestexact` `]` `--ctestthr` `]` `--ctestdebug` `]` `--ctestcreategold` `]`
`--ctestgui` `]`

Detailed Description: `bis_nonlineardistortioncorrection.tcl` Computes non-linear distortion corrections for echoplanar images. This is essentially one-dimensional non-rigid registration. Computes linear registration first, non-linear registration second.

[Inputs]

- `reference_image` (command line option `-inp`) : Reference Image
- `transform_image` (command line option `-inp2`) : Transform Image
- `initial_transform` (command line option `-inp3`) : Initial Transformation
- `weight_image` (command line option `-inp4`) : Reference Weight Image
- `weight_image2` (command line option `-inp5`) : Transform Weight Image

[Outputs]

- `output_transform` (command line option `-out`) : Output Transformation
- `output_image` (command line option `-out2`) : Transformed Image

[Options]

- `initialmode` : Type of initial registration. Default value is "rigid". Allowed values = [none, rigid, affine, similarity]
- `spacing` : Control Point Spacing in mm. Default value is "20.0". Allowed range is from 1.0 to 50.0
- `spacingrate` : Rate of increase of Control Point Spacing. Default value is "2.0". Allowed range is from 1.1 to 3.0
- `smoothness` : Smoothness factor (using bending energy regularization). Default value is "0.005". Allowed range is from 0.0 to 1.0
- `dir` : phase encode direction 0=x, 1=y, or 2=z. Default value is "1". Allowed range is from 0 to 2
- `windowSize` : Size (in control points of the window to use for computing gradients (2.0=full,1.0=accelerated). Default value is "1.0". Allowed range is from 1.0 to 2.0
- `extralevels` : Number of 'fluid' iterations at end of main level . Default value is "0". Allowed range is from 0 to 10
- `resolution` : resolution . Default value is "2.0". Allowed range is from 0.5 to 10.0
- `stepsize` : step size . Default value is "3.0". Allowed range is from 0.1 to 5.0
- `numberoflevels` : number of multiresolution levels. Default value is "3". Allowed range is from 1 to 5
- `metric` : Similarity Metric. Default value is "NMI". Allowed values = [SSD, CC, MI, NMI, JE]
- `iterations` : Number of iterations . Default value is "15". Allowed range is from 1 to 50
- `resolutionrate` : Rate at which to decrease the resolution. Default value is "2". Allowed range is from 1.05 to 3.0
- `autonormalize` : Autonormalize Intensities (i.e. saturate between 1% and 99% of intensity range). Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `optimization` : Optimization Method. Default value is "Default". Allowed values = [default, SlowClimb, GradientDescent, ConjugateGradient, Hybrid]
- `numberoffbins` : Number of bins for the joint histogram. Default value is "64". Allowed range is from 32 to 1024
- `numberofsteps` : Number of steps/level for the optimization. Default value is "1". Allowed range is from 1 to 5
- `reslimage` : Output a resliced image, or a red-green blend image, or no resliced image. Default value is "Resliced". Allowed values = [Resliced, ColorBlend]
- `useweightimage` : Weighted Registrations (0=none,1=ref only,2=both ref and target weights). Default value is "0". Allowed values = [0, 1, 2]

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions.

Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Refactored from pxmat_register.tcl.

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8.9 NonLinear Reg (bis_nonlinearintensityregister)

Description: bis_nonlinearintensityregister.tcl – computes a linear intensity based registrations.

Synopsis: bis_nonlinearintensityregister.tcl [--inp] [--inp2] [--inp3] [--inp4]
 [--inp5] [--out] [--out2] [--initialmode] [--spacing]
 [--spacingrate] [--smoothness] [--windowsize] [--extralevels] [--useinitial]
 [--resolution] [--stepsize] [--numberoflevels] [--metric] [--iterations]
 [--resolutionrate] [--autonormalize] [--optimization] [--numberofbins] [--numberofsteps]
 [--guiautosave] [--reslimage] [--useweightimage] [--dogui] [--pset]
 [--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave]
 [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold]
 [--ctestgui]

Detailed Description: `bis_nonlinearintensityregister.tcl` computes a linear intensity based registrations.

[Inputs]

- `reference_image` (command line option `-inp`) : Reference Image
- `transform_image` (command line option `-inp2`) : Transform Image
- `initial_transform` (command line option `-inp3`) : Initial Transformation
- `weight_image` (command line option `-inp4`) : Reference Weight Image
- `weight_image2` (command line option `-inp5`) : Transform Weight Image

[Outputs]

- `output_transform` (command line option `-out`) : Output Transformation
- `output_image` (command line option `-out2`) : Transformed Image

[Options]

- `initialmode` : Type of initial registration. Default value is "affine". Allowed values = [none, rigid, affine, similarity]
- `spacing` : Control Point Spacing in mm. Default value is "15.0". Allowed range is from 1.0 to 50.0
- `spacingrate` : Rate of increase of Control Point Spacing. Default value is "2.0". Allowed range is from 1.1 to 3.0
- `smoothness` : Smoothness factor (using bending energy regularization). Default value is "0.001". Allowed range is from 0.0 to 1.0
- `window_size` : Size (in control points of the window to use for computing gradients (2.0=full,1.0=accelerated)). Default value is "1.0". Allowed range is from 1.0 to 2.0
- `extralevels` : Number of 'fluid' iterations at end of main level . Default value is "0". Allowed range is from 0 to 10
- `useinitial` : Use Initial Transformation. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `resolution` : resolution . Default value is "1.5". Allowed range is from 0.5 to 10.0
- `stepsize` : step size . Default value is "1.0". Allowed range is from 0.1 to 5.0
- `numberoflevels` : number of multiresolution levels. Default value is "3". Allowed range is from 1 to 5
- `metric` : Similarity Metric. Default value is "NMI". Allowed values = [SSD, CC, MI, NMI, JE]
- `iterations` : Number of iterations . Default value is "15". Allowed range is from 1 to 50
- `resolutionrate` : Rate at which to decrease the resolution. Default value is "2". Allowed range is from 1.05 to 3.0
- `autonormalize` : Autonormalize Intensities (i.e. saturate between 1% and 99% of intensity range). Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `optimization` : Optimization Method. Default value is "Default". Allowed values = [default, SlowClimb, GradientDescent, ConjugateGradient, Hybrid]
- `numberofbins` : Number of bins for the joint histogram. Default value is "64". Allowed range is from 32 to 1024

- `numberofsteps` : Number of steps/level for the optimization. Default value is "1". Allowed range is from 1 to 5
- `reslimage` : Output a resliced image, or a red-green blend image, or no resliced image. Default value is "Resliced". Allowed values = [Resliced, ColorBlend]
- `useweightimage` : Weighted Registrations (0=none,1=ref only,2=both ref and target weights). Default value is "0". Allowed values = [0, 1, 2]

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Refactored from `pxmat_register.tcl`.

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8.10 NonLinear RPM (bis_nonlinearpointregister)

Description: bis_nonlinearpointregister.tcl – computes a linear point-based registrations.

Synopsis: bis_nonlinearpointregister.tcl [--inp] [--inp2] [--inp3] [--out]
[--out2] [--smoothstart] [--smoothend] [--cpsstart] [--cpsend]
[--linearmode] [--linearnumpoints] [--lineartstart] [--lineartstop] [--matchmode]
[--numpoints] [--tstart] [--tstop] [--useinitial] [--guiautosave]
[--dogui] [--pset] [--slicermode] [--loni] [--ctest]
[--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr]
[--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_nonlinearpointregister.tcl computes a linear point-based registrations.

[Inputs]

- reference_surface (command line option -inp) : Reference Surface
- transform_surface (command line option -inp2) : Transform Surface
- initial_transform (command line option -inp3) : Initial Transformation

[Outputs]

- output_transform (command line option -out) : Output Transformation
- output_surface (command line option -out2) : Transformed Surface

[Options]

- smoothstart : Starting Smoothness Value. Default value is "5.0". Allowed range is from 0.0 to 10.0
- smoothend : Final Smoothness Value. Default value is "1.0". Allowed range is from 0.0 to 10.0
- cpsstart : Starting Control Point Spacing. Default value is "30.0". Allowed range is from 0.0 to 100
- cpsend : Final Control Point Spacing. Default value is "15.0". Allowed range is from 0.0 to 100.0
- linearmode : Type of linear registration. Default value is "rigid". Allowed values = [rigid, affine, similarity, none]
- linearnumpoints : number of points for linear part (0=default, figure out from nonlinear). Default value is "0". Allowed range is from 0 to 10000
- lineartstart : linear start temperature (0=default, figure out from nonlinear). Default value is "0". Allowed range is from 0.0 to 10.0

- **lineartstop** : end temperature (0=default, figure out from nonlinear). Default value is "0". Allowed range is from 0.0 to 10.0
- **matchmode** : Match Mode either RPM or ICP. Default value is "rpm". Allowed values = [rpm, icp]
- **numpoints** : number of points . Default value is "800". Allowed range is from 0 to 10000
- **tstart** : Initial temperature . Default value is "5.0". Allowed range is from 0.0 to 100.0
- **tstop** : Final temperature . Default value is "2.0". Allowed range is from 0.0 to 100.0
- **useinitial** : Use Initial Transformation. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- **dogui** : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **pset** : Use Parameter set to set parameters. Default value is "".
- **slicermode** : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **loni** : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- **ctest** : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Refactored from pxmat_pointregister.tcl

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8.11 Serial Demons Mouse Registration (*bis_serialdemonmouserereg*)

Description: *bis_serialdemonmouserereg.tcl* – Serial demon registration

Synopsis: *bis_serialdemonmouserereg.tcl* [--inp] [--inp2] [--inp3] [--inp4]
[--out] [--out2] [--symmetric] [--debug] [--reduction]
[--dogui] [--pset] [--slicermode] [--loni] [--ctest]
[--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr]
[--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: *bis_serialdemonmouserereg.tcl* Serial demon registration This is the nonrigid whole body mouse registration algorithm from Suh et al MICCAI 2009.

[Inputs]

- *image_ref* (command line option *-inp*) : Reference Image
- *binary_image_ref* (command line option *-inp2*) : Reference Image Objectmap
- *image_trg* (command line option *-inp3*) : Transform Image
- *binary_image_trg* (command line option *-inp4*) : Transform Image Objectmap

[Outputs]

- *transformation* (command line option *-out*) : Transformation
- *warped_target* (command line option *-out2*) : Resliced Target Image

[Options]

- *symmetric* : Symmetric or Non-symmetric. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- *debug* : Debug Output On/Off. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- *reduction* : Perform computations on reduced image size . Default value is "1". Allowed range is from 1 to 12

[Common Options]

- *dogui* : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- *pset* : Use Parameter set to set parameters. Default value is "".

- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

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8.12 Compute Jacobian (bis_singlejacobian)

Description: bis_singlejacobian.tcl – computes either the determinant of the jacobian or the full tensor for a transformation.

Synopsis: `bis_singlejacobian.tcl` [--inp] [--inp2] [--inp3] [--out]
 [--resolution] [--threshold] [--mode] [--dogui] [--pset]
 [--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave]
 [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold]
 [--ctestgui]

Detailed Description: `bis_singlejacobian.tcl` computes either the determinant of the jacobian or the full tensor for a transformation.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image
- `second_image` (command line option `-inp2`) : (Not used)
- `transformation` (command line option `-inp3`) : Transformation

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `resolution` : resolution. Default value is "3.0". Allowed range is from -1 to 10.0
- `threshold` : jacobian image threshold . Default value is "0.05". Allowed range is from 0.0 to 1.0
- `mode` : switch output files. Default value is "jacobian". Allowed values = [jacobian, tensor, strains]

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999

- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxsinglejacobian.tcl`

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8.13 Visualize Transformation (`bis_visualizetransformation`)

Description: `bis_visualizetransformation.tcl` – Creates a grid visualization of a transformation

Synopsis: `bis_visualizetransformation.tcl` `--inp` `]` `--inp2` `]` `--inp3` `]` `--out` `]`
`--sp` `]` `--zsp` `]` `--opa` `]` `--int` `]` `--dogui` `]`
`--pset` `]` `--slicermode` `]` `--loni` `]` `--ctest` `]` `--ctestline` `]`
`--ctestsave` `]` `--ctesttmpdir` `]` `--ctestexact` `]` `--ctestthr` `]` `--ctestdebug` `]`
`--ctestcreategold` `]` `--ctestgui` `]`

Detailed Description: `bis_visualizetransformation.tcl` Creates a grid visualization of a transformation a useful check of the quality of the transformations

[Inputs]

- `input_image` (command line option `-inp`) : Input Image
- `second_image` (command line option `-inp2`) : Overlay Image
- `transformation` (command line option `-inp3`) : Transformation

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `sp` : Spacing (in voxels) for lines. Default value is "8". Allowed range is from 4 to 32
- `zsp` : Spacing (in voxels) for lines in z direction. Default value is "8". Allowed range is from 4 to 32
- `opa` : Grid Opacity. Default value is "0.5". Allowed range is from 0.0 to 1.0
- `int` : Grid Intensity. Default value is "0.9". Allowed range is from 0.0 to 5.0

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: none

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Chapter 9

Segmentation

9.1 Intensity Segmentation (`bis_intsegment`)

Description: `bis_intsegment.tcl` – segment image.

Synopsis: `bis_intsegment.tcl` `--inp` `]` `--out` `]` `--algorithm` `]` `--numclasses` `]`
`--smoothness` `]` `--maxsigmaratio` `]` `--iterations` `]` `--clustiterations` `]` `--numbins` `]`
`--epsilon` `]` `--dogui` `]` `--pset` `]` `--slicermode` `]` `--loni` `]`
`--ctest` `]` `--ctestline` `]` `--ctestsave` `]` `--ctesttmpdir` `]` `--ctestexact` `]`
`--ctestthr` `]` `--ctestdebug` `]` `--ctestcreategold` `]` `--ctestgui` `]`

Detailed Description: `bis_intsegment.tcl` segment image.

[Inputs]

- `input_image` (command line option `--inp`) : Input Image

[Outputs]

- `output_image` (command line option `--out`) : Output Image

[Options]

- `algorithm` : Algorithm to use for segmentation . Default value is "Clustering". Allowed values = [Clustering, MRF]
- `numclasses` : Number of classes (tissue labels) including background . Default value is "3". Allowed range is from 2 to 10
- `smoothness` : Spatial smoothness. If algorithm is set to clustering this is ignored . Default value is "1.0". Allowed range is from 0.01 to 10.0

- maxsigmaratio : The ratio of the max standard deviation to the min standard deviation. Default value is "0.05". Allowed range is from 0.0 to 1.0
- iterations : Number of iterations in Markov Random Field smoothness relaxation. Default value is "20". Allowed range is from 2 to 40
- clustiterations : Number of iterations in Clustering Step. Default value is "50". Allowed range is from 2 to 100
- numbins : Number of bins in Clustering Step. Default value is "256". Allowed range is from 16 to 1024
- epsilon : Convergence level (percentage of changed voxels). Default value is "0.05". Allowed range is from 0.0 to 10.0

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range

is from 0 to 1

Backward Compatibility Issues: The default output filename was `****_quicksegm` when smoothness is set 0. Now the default output file is always `**_segm`. upon request.

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9.2 Tissue Levelset (bis_levelset)

Description: `bis_levelset.tcl` – Performs levelset segmentation using the levelset method of Chan and Vesse with bi-exponential output extensions

Synopsis: `bis_levelset.tcl` `--inp` `]` `--inp2` `]` `--inp3` `]` `--out` `]`
`--insidemean` `]` `--outsidemean` `]` `--insidesigma` `]` `--outsidesigma` `]` `--biexponential` `]`
`--outsidemean2` `]` `--outsidesigma2` `]` `--dynamicupdate` `]` `--approximatevolume` `]` `--volumew`
`--beginlevel` `]` `--endlevel` `]` `--initial_mode` `]` `--edgestrength` `]` `--propagationstrength` `]`
`--smoothnessstrength` `]` `--iterations` `]` `--radius` `]` `--seedx` `]` `--seedy` `]`
`--seedz` `]` `--updatepercentage` `]` `--tolerance` `]` `--dogui` `]` `--pset` `]`
`--slicermode` `]` `--loni` `]` `--ctest` `]` `--ctestline` `]` `--ctestsave` `]`
`--ctesttmpdir` `]` `--ctestexact` `]` `--ctestthr` `]` `--ctestdebug` `]` `--ctestcreategold` `]`
`--ctestgui` `]`

Detailed Description: `bis_levelset.tcl` Performs levelset segmentation using the levelset method of Chan and Vesse with bi-exponential output extensions

[Inputs]

- `input_image` (command line option `-inp`) : Input Image
- `initial_levelset` (command line option `-inp2`) : Initial Levelset
- `seed_points` (command line option `-inp3`) : Seed Points

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `insidemean` : Inside Mean Intensity. Default value is "100". Allowed range is from -100000 to 100000
- `outsidemean` : Outside Mean Intensity. Default value is "20". Allowed range is from -100000 to 100000
- `insidesigma` : Inside Standard Deviation of Intensity. Default value is "10". Allowed range is from -100000 to 100000

- `outsidesigma` : Outside Standard Deviation Intensity. Default value is "10". Allowed range is from -100000 to 100000
- `biexponential` : Outside Distribution is BiExponential. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `outsidemean2` : Outside Mean Intensity 2. Default value is "50". Allowed range is from -100000 to 100000
- `outsidesigma2` : Outside Standard Deviation Intensity 2. Default value is "100". Allowed range is from -100000 to 100000
- `dynamicupdate` : Dynamic Parameter Update. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `approximatevolume` : Volume to constrain levelset to. Default value is "1000". Allowed range is from 0 to 100000
- `volumeweight` : Volume constraint weight. Default value is "0.0". Allowed range is from 0.0 to 100.0
- `beginlevel` : Starting Resolution Level (x native). Default value is "2". Allowed range is from 1 to 4
- `endlevel` : Final Resolution Level (x native). Default value is "2". Allowed range is from 1 to 4
- `initial_mode` : Initialization Mode. Default value is "seedpoint". Allowed values = [seedpoint, landmarks, levelset]
- `edgestrength` : Strength of Edge. Default value is "0.0". Allowed range is from 0.0 to 10.0
- `propagationstrength` : Strength of Propagation. Default value is "1.0". Allowed range is from 0.0 to 10.0
- `smoothnessstrength` : Smoothness Factor. Default value is "0.2". Allowed range is from 0.0 to 10.0
- `iterations` : Number of Iterations for Updates. Default value is "50". Allowed range is from 1 to 2000
- `radius` : Radius of Initial Ball. Default value is "3.0". Allowed range is from 1.0 to 10.0
- `seedx` : Seed position x. Default value is "91". Allowed range is from 0 to 255
- `seedy` : Seed position y. Default value is "91". Allowed range is from 0 to 255
- `seedz` : Seed position z. Default value is "91". Allowed range is from 0 to 255
- `updatepercentage` : Update Percentage. Default value is "0.1". Allowed range is from 0.0 to 1.0
- `tolerance` : Tolerance for Convergenece in mm. Default value is "0.00001". Allowed range is from 0.0 to 1.0

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions.

Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: None

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9.3 Strip Skull (bis_stripskull)

Description: bis_stripskull.tcl – Performs skull stripping

Synopsis: bis_stripskull.tcl [--inp] [--out] [--out2] [--out3]
 [--radiusfactor] [--subdivisions] [--iterations] [--tolerance] [--smoothing]
 [--numpasses] [--initMethod] [--manRadius] [--manX] [--manY]
 [--manZ] [--numbins] [--minPercent] [--maxPercent] [--minIntenSearchDist]
 [--maxIntenSearchDist] [--rMin] [--rMax] [--localThreshConst] [--selfIntersectThresh]
 [--dogui] [--pset] [--slicermode] [--loni] [--ctest]
 [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr]
 [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_stripskull.tcl` Performs skull stripping a reimplementaion of the BET algorithm

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image
- `output_mask` (command line option `-out2`) : Output Mask
- `output_surface` (command line option `-out3`) : Output Surface

[Options]

- `radiusfactor` : Scale Factor for the Radius. Default value is "0.5". Allowed range is from 0.2 to 1.0
- `subdivisions` : Number of Subvidisions for Icosahedron. Default value is "4". Allowed range is from 0 to 8
- `iterations` : Number of Iterations for Updates. Default value is "1000". Allowed range is from 1 to 2000
- `tolerance` : Tolerance for Convergenece in mm. Default value is "0.1". Allowed range is from 0.0 to 2.0
- `smoothing` : Use Increased Smoothing. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `numpasses` : Number Passes Made To Smooth the Surface. Default value is "10". Allowed range is from 1 to 10
- `initMethod` : Set the Center of Gravity and Radius Automatically, Manually, or Using the Crosshairs. Default value is "auto". Allowed values = [auto, manual, crosshair]
- `manRadius` : Set the Initial Surface Radius Manually. Default value is "1.0". Allowed range is from 0.01 to 1000.0
- `manX` : Set the Initial Surface Center x-coord Manually (Using Display Coordinates). Default value is "0.0". Allowed range is from 0.0 to 1000.0
- `manY` : Set the Initial Surface Center y-coord Manually (Using Display Coordinates). Default value is "0.0". Allowed range is from 0.0 to 1000.0
- `manZ` : Set the Initial Surface Center z-coord Manually (Using Display Coordinates). Default value is "0.0". Allowed range is from 0.0 to 1000.0
- `numbins` : Number of Bins for Histogram Fitting. Default value is "1000". Allowed range is from 32 to 1024
- `minPercent` : Cummulative Histogram Lower Threshold Percent. Default value is "0.02". Allowed range is from 0.0 to 0.5
- `maxPercent` : Cummulative Histogram Upper Threshold Percent. Default value is "0.98". Allowed range is from 0.5 to 1.0
- `minIntenSearchDist` : Distance Searched for Minimum Intensity. Default value is "7.0". Allowed range is from 1.0 to 20.0
- `maxIntenSearchDist` : Distance Searched for Maximum Intensity. Default value is "3.0". Allowed range is from 0.5 to 10.0

- rMin : Minimum Local Radius Used for Smoothing. Default value is "3.33". Allowed range is from 0.1 to 100.0
- rMax : Maximum Local Radius Used for Smoothing. Default value is "10.0". Allowed range is from 0.1 to 100.0
- localThreshConst : Local Fractional Constant. Default value is "0.5". Allowed range is from 0.01 to 1.0
- selfIntersectThresh : Threshold for Surface Self-Intersections. Default value is "3000". Allowed range is from 0 to 10000

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: None

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Chapter 10

Functional Imaging

10.1 Compute Correlations (bis_computecorrelations)

Description: bis_computecorrelations.tcl – Compute Correlations between the 4D image as input 1 and the measures in filename. 4D Image must have the same number of frames as the subjects in the filename.

Synopsis: bis_computecorrelations.tcl [--inp] [--out] [--mname] [--split]
[--raw] [--dogui] [--pset] [--slicermode] [--loni]
[--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
[--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_computecorrelations.tcl Compute Correlations between the 4D image as input 1 and the measures in filename. 4D Image must have the same number of frames as the subjects in the filename. Measures File Example ————— #Individual Subject
Measures #Number of Subjects 4 #Number of Measures 2 #Data (either , or tab-delimited)
Subject IQ Weight 1314 100 100 1361 110 200 1518 120 200 2205 130 121 —————

[Inputs]

- input_image (command line option -inp) : 4D Input Image

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- mname : specify the measures file used to compute the correlations. Default value is "".

- split : save individual measures to separate files (if guimode then off by default). Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- raw : Output is raw-correlations instead of z-scores. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

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10.2 Compute GLM Regression (bis_computeglm)

Description: bis_computeglm.tcl – Compute GLM Fit using Matrix to define regressors. Optionally save the residual image.

Synopsis: bis_computeglm.tcl [--inp] [--out] [--out2] [--matrix]
[--matrixname] [--residual] [--dogui] [--pset] [--slicermode]
[--loni] [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir]
[--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_computeglm.tcl Compute GLM Fit using Matrix to define regressors. Optionally save the residual image.

[Inputs]

- input_image (command line option -inp) : Input Image

[Outputs]

- output_image (command line option -out) : Output Image
- resimage (command line option -out2) : Residual Image

[Options]

- matrix : GLM matrix file name, either in Matlab .mat format or BioImage Suite .matr format. Default value is "".
- matrixname : Name of Matrix in matlab file e.g. Q.set Default value is "".
- residual : Generate residual image. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

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10.3 Matrix Correlation (bis_matrixcorrelation)

Description: bis_matrixcorrelation.tcl – Calculate correlation among time series.

Synopsis: bis_matrixcorrelation.tcl [--inp] [--out] [--guicmt] [--dotextfile]
[--filename] [--raw] [--dogui] [--pset] [--slicermode]
[--loni] [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir]
[--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: **bis_matrixcorrelation.tcl** Calculate correlation among time series. Calculate correlation between pairs of voxels. Usually input image is a ROI mean image. Can use ROI Mean algorithm to generate such image.

[Inputs]

- **input_image** (command line option `-inp`) : ROI Mean

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- dotextfile : Generate output text file. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- filename : specify the filename for the output text file. Default value is "bismatrix_result.txt".
- raw : Raw Correlation. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range

is from 0 to 1

Backward Compatibility Issues:

Authors: isabella.murphy@yale.edu, xilin.shen@yale.edu

10.4 MultiSubject fMRI (bis_multisubjectfmri)

Description: bis_multisubjectfmri.tcl – Mostly a test class for pxitclmultisubject.tcl based multi subject operations

Synopsis: bis_multisubjectfmri.tcl [--out] [--out2] [--out3] [--setup]
[--mode] [--resol] [--interp] [--task] [--guitask]
[--guishowmsb] [--dogui] [--pset] [--slicermode] [--loni]
[--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
[--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_multisubjectfmri.tcl Mostly a test class for pxitclmultisubject.tcl based multi subject operations

[Outputs]

- output_image (command line option -out) : Output Image
- second_output (command line option -out2) : Sigma Image
- third_output (command line option -out3) : Tscore Image

[Options]

- setup : MultiSubject .msb Setup file name. Default value is "".
- mode : Operation to perform. Default value is "Average". Allowed values = [Average, AverageAnat, VOI, Create4D, Create4DVOI]
- resol : Resolution of Output Image. Default value is "3.0". Allowed values = [Ref, 1.5, 2.0, 3.0, 4.5]
- interp : Interpolation Mode. Default value is "Cubic". Allowed values = [NearestNeighbor, Linear, Cubic]
- task : Task Number to perform operation for. Default value is "1". Allowed range is from 1 to 40

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".

- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Uses pxitchmultisubject.tcl

Authors: xenophon.papademetris.yale.edu

10.5 R-value to 1-p value (bis_rtopvalue)

Description: bis_rtopvalue.tcl – Converts r value to 1-p value.

Synopsis: bis_rtopvalue.tcl [--inp] [--out] [--subject] [--dof]
 [--scaleFactor] [--dogui] [--pset] [--slicermode] [--loni]
 [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]

`--ctestthr ] [--ctestdebug ] [--ctestcreategold ] [--ctestgui ]`

Detailed Description: `bis_rtopvalue.tcl` Converts r value to 1-p value. Take behavior correlation r value and number of subjects, degree of freedom as input, convert to 1-p value.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `subject` : Number of Subjects. Default value is "0". Allowed range is from 0 to 100000000
- `dof` : Degree of Freedom. Default value is "0". Allowed range is from 0 to 100000000
- `scaleFactor` : Scale factor . Default value is "1.0". Allowed range is from -100000000.0 to 100000000.0

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value

is "1". Allowed values are either 0 (Off) or 1 (On)

- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: N/A

Authors: isabella.murphy@yale.edu,xilin.shen@yale.edu

10.6 R-value to T-Score (bis_rtotmap)

Description: `bis_rtotmap.tcl` – convert r value to t value.

Synopsis: `bis_rtotmap.tcl` [--inp] [--out] [--subject] [--dogui]
 [--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
 [--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]
 [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_rtotmap.tcl` convert r value to t value. take behavior correlation r value and number of subjects as input, convert to t value.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `subject` : Number of Subjects. Default value is "6". Allowed range is from 6 to 100000000

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: N/A

Authors: isabella.murphy@yale.edu,xilin.shen@yale.edu

10.7 Seed Correlation (bis_seedcorrelation)

Description: bis_seedcorrelation.tcl – Correlation between brain and ROIs.

Synopsis: `bis_seedcorrelation.tcl` [--inp] [--inp2] [--inp3] [--out]
[--usemask] [--raw] [--ztransform] [--dogui] [--pset]
[--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave]
[--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold]
[--ctestgui]

Detailed Description: `bis_seedcorrelation.tcl` Correlation between brain and ROIs. Calculate correlation among ROIs and the whole brain image voxel by voxel.

[Inputs]

- `input_image` (command line option `-inp`) : Functional Image
- `second_image` (command line option `-inp2`) : ROI Mean
- `third_image` (command line option `-inp3`) : Mask Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `usemask` : Use Mask Image. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `raw` : Raw Correlation. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ztransform` : Z Transform. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: isabella.murphy@yale.edu, xilin.shen@yale.edu.

10.8 MultiSubject fMRI (bis_singlesubjectfmri)

Description: `bis_singlesubjectfmri.tcl` – Mostly a test class for `bis_fmrisetup.tcl` based single subject fMRI Operations

Synopsis: `bis_singlesubjectfmri.tcl` `--out` `--out2` `--out3` `--out4` `--out5` `--out6` `--out7` `--out8` `--out9` `--setup` `--setup2` `--mode` `--guilabel` `--outdir` `--tmpresults` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_singlesubjectfmri.tcl` Mostly a test class for `bis_fmrisetup.tcl` based single subject fMRI Operations

[Outputs]

- `output_image` (command line option `-out`) : Output Image
- `output2` (command line option `-out2`) : Output 2
- `output3` (command line option `-out3`) : Output 3
- `output4` (command line option `-out4`) : Output 4
- `output5` (command line option `-out5`) : Output 5
- `output6` (command line option `-out6`) : Output 6

- output7 (command line option `-out7`) : Output 7
- output8 (command line option `-out8`) : Output 8
- output9 (command line option `-out9`) : Output 9

[Options]

- setup : Input .xmlg Setup file name. Default value is "".
- setup2 : Optional Second .xmlg Setup file name. Default value is "".
- mode : Operation to perform. Default value is "glm". Allowed values = [glm, seed, matrix, taskseed, whole, ipsi, contra]
- outdir : Specify the output directory for the results. Default value is "".
- tmpresults : If on then results will be deleted on exit (use for testing). Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from

0 to 9999

- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Uses bis_fmrisetup.tcl

Authors: xenophon.papademetris.yale.edu

10.9 T-score to P-value (bis_tmaptopvalue)

Description: bis_tmaptopvalue.tcl – converts tmap to pvalue.

Synopsis: bis_tmaptopvalue.tcl [--inp] [--out] [--dof] [--scaleFactor]
[--autoscale] [--dogui] [--pset] [--slicermode] [--loni]
[--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
[--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_tmaptopvalue.tcl converts tmap to pvalue.

[Inputs]

- input_image (command line option -inp) : Input Image

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- dof : Degree of Freedom. Default value is "1". Allowed range is from .0 to 100000000
- scaleFactor : Scale factor . Default value is "1.0". Allowed range is from -100000000.0 to 100000000.0
- autoscale : Detect Whether t-values are scaled by 1000 or not. Default value is "1". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: N/A

Authors: hirohito.okuda@yale.edu, xenophon.papademetris@yale.edu.

10.10 T-score to Z-score (bis_tmaptozscore)

Description: `bis_tmaptozscore.tcl` – converts tmap to zscore.

Synopsis: `bis_tmaptozscore.tcl` [--inp] [--out] [--dof] [--scaleFactor]
 [--autoscale] [--dogui] [--pset] [--slicermode] [--loni]
 [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
 [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_tmaptozscore.tcl` converts tmap to zscore.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `dof` : Degree of Freedom. Default value is "1". Allowed range is from .0 to 100000000
- `scaleFactor` : Scale factor . Default value is "1.0". Allowed range is from -100000000.0 to 100000000.0
- `autoscale` : Detect Whether t-values are scaled by 1000 or not. Default value is "1". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)

- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: N/A

Authors: hirohito.okuda@yale.edu, xenophon.papademetris@yale.edu.

10.11 Zmap to pvalue (bis_zscoretopvalue)

Description: `bis_zscoretopvalue.tcl` – Converts zmap to pvalue.

Synopsis: `bis_zscoretopvalue.tcl` [--inp] [--out] [--guicmt] [--dogui]
[--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
[--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]
[--ctestcreategold] [--ctestgui]

Detailed Description: `bis_zscoretopvalue.tcl` Converts zmap to pvalue. Take zmap as input and output it p-value.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: N/A

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Chapter 11

DiffSPECT

11.1 ISAS (bis_ISAS)

Description: bis_ISAS.tcl –

Synopsis: bis_spectbase.tcl [--inp] [--inp2] [--inp3] [--inp4]
[--inp5] [--out] [--usemask] [--smoothval] [--dogui]
[--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
[--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]
[--ctestcreategold] [--ctestgui]

Detailed Description: bis_ISAS.tcl The basic idea of ISAS is to compute the difference between an ictal and interictal SPECT scan for a single patient. The differences of the ictal/inter-ictal comparison are checked against a healthy normal database to determine the normal expected variation. Significant increases and decreases in CBF (cerebral blood flow) between the interictal and ictal SPECT can then be detected to predict seizure localization. All inputs to this algorithm are expected to be registered to the 2mm MNI brain. The user specify the interictal spect as input one and the ictal spect as input two. If the user want to use a custom healthy control poplation, the user can optionally specify a mean spect, standard deviation spect, and/or a brain mask. Otherwise these image are automaically set to the ISAS health normal database. The user can also specify the smoothing kernal use in the algorithm. The default value is 16mm FWHM

[Inputs]

- input_image (command line option -inp) : Interictal SPECT
- second_image (command line option -inp2) : Ictal SPECT
- stdimage (command line option -inp3) : Standard Deviation Spect Image (Optional)
- meanimage (command line option -inp4) : Mean Spect Image (Optional)
- maskimage (command line option -inp5) : Mask for Analysis (Optional)

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `usemask` : Mask used to remove the skull on spect images. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `smoothval` : FWHM Gaussian smoothing kernel in mm. Default value is "16.0". Allowed range is from 0.0 to 20.0

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range

is from 0 to 1

Backward Compatibility Issues: ISAS see <http://spect.yale.edu>

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11.2 Diff SPECT with ISASHN (bis_ISASHN)

Description: `bis_ISASHN.tcl` –

Synopsis: `bis_spectbase.tcl` `--inp` `--inp2` `--inp3` `--inp4` `--out` `--usemask` `--smoothval` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_ISASHN.tcl` The basic idea of ISASHN is to compute the difference between an ictal and interictal SPECT scan for a single patient. The differences of the ictal/interictal comparison are checked against a healthy normal database to determine the normal expected variation. Significant increases and decreases in CBF (cerebral blood flow) between the interictal and ictal SPECT can then be detected to predict seizure localization. All inputs to this algorithm are expected to be registered to the 2mm MNI brain. The user specify the interictal spect as input one and the ictal spect as input two. If the user want to use a custom healthy control poplation, the user can optionally specify a standard deviation spect, and/or a brain mask. Otherwise these image are automaically set to the ISAS health normal database. The user can also specify the smoothing kernal use in the algorithm. The default value is 16mm FWHM. See Scheinost et. al 2009 ISBI

[Inputs]

- `input_image` (command line option `--inp`) : Interictal SPECT
- `second_image` (command line option `--inp2`) : Ictal SPECT
- `stdimage` (command line option `--inp3`) : Standard Deviation Spect Image (Optional)
- `maskimage` (command line option `--inp4`) : Mask for Analysis (Optional)

[Outputs]

- `output_image` (command line option `--out`) : Output Image

[Options]

- `usemask` : Mask used to remove the skull on spect images. Default value is "1". Allowed values are either 0 (Off) or 1 (On)

- smoothval : FWHM Gaussian smoothing kernel in mm. Default value is "16.0". Allowed range is from 0.0 to 20.0

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: ISAS see <http://spect.yale.edu>

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11.3 Calculate RF (bis_spectrf)

Description: bis_spectrf.tcl – Computes Statistics for DIFF Spect Analysis

Synopsis: bis_spectrf.tcl [--inp] [--out] [--savefile] [--filename]
[--mode] [--sig] [--ext] [--dogui] [--pset]
[--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave]
[--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold]
[--ctestgui]

Detailed Description: bis_spectrf.tcl Computes Statistics for DIFF Spect Analysis

[Inputs]

- input_image (command line option -inp) : Input Image

[Outputs]

- output_image (command line option -out) : Output Image

[Options]

- savefile : Generate and save an output text file. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- filename : specify the filename for the output text file. Default value is "spectrf_result.txt".
- mode : Perform Hyperperfusion or Hypoperfusion statistics. Default value is "hyper". Allowed values = [hyper, hypo]
- sig : P-value Significance level threshold. Default value is "0.01". Allowed range is from 0.000000000000000001 to 1
- ext : Minimum cluster size used for analysis. Default value is "125". Allowed range is from 1 to 1000000

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

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Chapter 12

Diffusion Tensor

12.1 Compute Tensor (`bis_computetensor`)

Description: `bis_computetensor.tcl` – Given Raw DWI images, it estimates the symmetric 6-component tensor

Synopsis: `bis_computetensor.tcl` `--out` `--out2` `--out3` `--directions` `--ndw` `--bval` `--dirfname` `--flipx` `--flipy` `--flipz` `--guishowcontrol` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui` `input_image1` `input_image2` ... `input_imageN`

Detailed Description: `bis_computetensor.tcl` Given Raw DWI images, it estimates the symmetric 6-component tensor BioImage Suite assumes(or forces on load in the case of NIFTI images) LPS Image Orientation hence `flipx=flipy=1` by default

[Inputs]

- `input_image` list – specify the list of names for this at the end of the command line

[Outputs]

- `output_image` (command line option `-out`) : Tensor Image
- `outadc` (command line option `-out2`) : ADC
- `outbase` (command line option `-out3`) : Baseline

[Options]

- directions : acquisition directions. Default value is "ME6". Allowed values = [ME6, ICO6, ICO10, ICO15, ICO21, ME24, ME32, Custom]
- ndw : Number of Baseline Images. Default value is "1". Allowed range is from 0 to 20
- bval : b-value (s/mm**2). Default value is "1000". Allowed range is from 1 to 10000
- dirname : specify the filename for custom directions. Default value is "".
- flipx : Flip the x-direction of the images. Default value is "Auto". Allowed values = [On, Off, Auto]
- flipy : Flip the y-direction of the images. Default value is "Auto". Allowed values = [On, Off, Auto]
- flipz : Flip the z-direction of the images. Default value is "Auto". Allowed values = [On, Off, Auto]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999

- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_diffusionutility.tcl`

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12.2 Tensor Reslice (`bis_reslicetensor`)

Description: `bis_reslicetensor.tcl` – Reslices an tensor/vector image using one or more transformations.

Synopsis: `bis_reslicetensor.tcl` `--inp` `--inp2` `--inp3` `--inp4` `--inp5` `--out` `--interp` `--background` `--flipx` `--flipy` `--flipz` `--quick` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_reslicetensor.tcl` Reslices an tensor/vector image using one or more transformations. This modifies the tensor with a local rigid transformation estimated at each voxel

[Inputs]

- `input_image` (command line option `-inp`) : Reference Image
- `second_image` (command line option `-inp2`) : Tensor or Vector Image
- `transformation` (command line option `-inp3`) : Transformation
- `xform2` (command line option `-inp4`) : Transformation 2
- `xform3` (command line option `-inp5`) : Transformation 3

[Outputs]

- `output_image` (command line option `-out`) : Output Image

[Options]

- `interp` : Interpolation Mode that is used when reslicing the image. Default value is "Linear". Allowed values = [NearestNeighbor, Linear, Cubic]
- `background` : Background Level used to fill voxels outside of mapped area. Default value is "0.0". Allowed range is from -100000 to 100000
- `flipx` : Flip the x-direction of the images. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

- `flipy` : Flip the y-direction of the images. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `flipz` : Flip the z-direction of the images. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `quick` : If one use 6 neighboring voxels to estimate the local rotation, else use 26 neighbors. Default value is "1". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_reslicetensor.tcl`.

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12.3 Compute DTI Maps (bis_tensoranalysis)

Description: bis_tensoranalysis.tcl – computes FA map, orientation map and optionally (RA, MD, VR, CI).

Synopsis: bis_tensoranalysis.tcl [--inp] [--out] [--out2] [--out3]
[--out4] [--cscheme] [--satfactor] [--brightness] [--usemask]
[--guishowcontrol] [--dogui] [--pset] [--slicermode] [--loni]
[--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
[--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_tensoranalysis.tcl computes FA map, orientation map and optionally (RA, MD, VR, CI). This tool takes as an input a calculated tensor map and computes useful maps such as the Fractional Anisotropy map, an orientation colormap and optionally Relative Anisotropy map, Volume Ratio map, Mean Diffusivity map, Inter voxel Coherence map

[Inputs]

- input_image (command line option -inp) : Tensor Image

[Outputs]

- output_image (command line option -out) : Frac Anisotropy Map
- out_ormap (command line option -out2) : Orientation Map
- out_ramap (command line option -out3) : Relative Anisotropy map
- out_meand (command line option -out4) : Mean Diffusivity map

[Options]

- cscheme : Color Scheme for orientation map. Default value is "Absolute". Allowed values = [AbsoluteValue, RotSymmetry, NoSymmetry, MirrorSymmetry]
- satfactor : Saturation Factor. Default value is "0.5". Allowed range is from 0.1 to 5.0
- brightness : Brightness. Default value is "2.0". Allowed range is from 0.1 to 5.0
- usemask : Use Mask when creating orientation map. Default value is "1". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".

- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from pxmat_tensoranalysis.tcl

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Chapter 13

Vascular Imaging

13.1 Frangi Vesselness (`bis_frangivesselness`)

Description: `bis_frangivesselness.tcl` – computes the multiscale hessian tensor and associated vesselness and scale images from Frangi 1998.

Synopsis: `bis_frangivesselness.tcl` `--inp` `]` `--out` `]` `--out2` `]` `--out3` `]`
`--frac` `]` `--numscales` `]` `--minscale` `]` `--maxscale` `]` `--logarithmic` `]`
`--smoothing` `]` `--scalevesselness` `]` `--debug` `]` `--dogui` `]` `--pset` `]`
`--slicermode` `]` `--loni` `]` `--ctest` `]` `--ctestline` `]` `--ctestsave` `]`
`--ctesttmpdir` `]` `--ctestexact` `]` `--ctestthr` `]` `--ctestdebug` `]` `--ctestcreategold` `]`
`--ctestgui` `]`

Detailed Description: `bis_frangivesselness.tcl` computes the multiscale hessian tensor and associated vesselness and scale images from Frangi 1998.

[Inputs]

- `input_image` (command line option `-inp`) : Input Image

[Outputs]

- `output_image` (command line option `-out`) : Output Image
- `outhessian` (command line option `-out2`) : Hessian
- `outscale` (command line option `-out3`) : Scale

[Options]

- `frac` : max intensity in the middle of the vessel (0..1) where 1= max intensity of the image. Default value is "0.7". Allowed range is from 0.0 to 1.0

- numscale : number of scales . Default value is "1". Allowed range is from 1 to 20
- minscale : minimum scale in voxels. Default value is "1.0". Allowed range is from 0.1 to 25.0
- maxscale : maximum scale in voxels. Default value is "5.0". Allowed range is from 1.0 to 25.0
- logarithmic : use logarithmic scale spacing. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- smoothing : post-process gaussian smoothing. Default value is "0.0". Allowed range is from 0.0 to 4.0
- scalevesselness : scale vesselness. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- debug : Debug Mode – prints more info as process is running. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999

- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from pxmat_vesselutility.tcl.

Authors: hirohito.okuda@yale.edu,xenophon.papademetris.yale.edu

13.2 Qian Vesselness (bis_qianvesselness)

Description: bis_qianvesselness.tcl – computes the non-parameteric vesselness measure from Qian et al, MedIA 2009.

Synopsis: bis_qianvesselness.tcl [--inp] [--out] [--out2] [--out3]
[--out4] [--out5] [--out6] [--beta] [--mode]
[--subdivide] [--radius] [--forcecpu] [--debug] [--dogui]
[--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
[--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]
[--ctestcreategold] [--ctestgui]

Detailed Description: bis_qianvesselness.tcl computes the non-parameteric vesselness measure from Qian et al, MedIA 2009.

[Inputs]

- input_image (command line option -inp) : Input Image

[Outputs]

- output_image (command line option -out) : Output Image
- outdeviation (command line option -out2) : Deviation
- outmean (command line option -out3) : Mean
- wedges (command line option -out4) : Wedges
- outbright (command line option -out5) : Brightness
- outtight (command line option -out6) : Tightness

[Options]

- beta : Beta factor. Default value is "800.0". Allowed range is from 1.0 to 10000.0
- mode : Sphere Subdivision (Original=theta,phi), New = barycentric, NewWedges=barycentric wedges. Default value is "New". Allowed values = [Orig, New, NewWedges]
- subdivide : Subdivide Sphere (New Sphere), if on use adds more. Default value is "1". Allowed range is from 0 to 3

- radius : Sphere Radius. Default value is "8". Allowed range is from 1 to 100
- forcecpu : Force Execution on CPU. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- debug : Debug Mode – prints more info as process is running. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: N/A.

Authors: Levent Alpoge: levent.alpoge@gmail.com, xenophon.papademetris@yale.edu

Chapter 14

Landmarks Processing

14.1 Resample Landmarks (bis_resamplelandmarks)

Description: bis_resamplelandmarks.tcl – Sampling/Sub-sampling curves stored as landmarks

Synopsis: bis_resamplelandmarks.tcl [--inp] [--out] [--mode] [--factor]
[--distance] [--dogui] [--pset] [--slicermode] [--loni]
[--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact]
[--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: bis_resamplelandmarks.tcl Sampling/Sub-sampling curves stored as landmarks

[Inputs]

- input_landmarks (command line option -inp) : Input Landmarks

[Outputs]

- output_landmarks (command line option -out) : Output Landmarks

[Options]

- mode : Type of resampling (sample, subsample, resample). Default value is "resample". Allowed values = [sample, subsample, resample]
- factor : Factor for sampling or subsampling operations. Default value is "2". Allowed range is from 2 to 8
- distance : Distance to equisample a curve for. Default value is "1.0". Allowed range is from 0.1 to 10.0

[Common Options]

- **dogui** : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **pset** : Use Parameter set to set parameters. Default value is "".
- **slicermode** : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **loni** : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- **ctest** : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- **ctestline** : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- **ctestsave** : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- **ctesttmpdir** : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- **ctestexact** : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- **ctestthr** : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- **ctestdebug** : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- **ctestcreategold** : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- **ctestgui** : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: xenophon.papademetris@yale.edu

14.2 Smooth Landmarks (*bis_smoothlandmarks*)

Description: *bis_smoothlandmarks.tcl* – Smoothing a curve stored as landmarks

Synopsis: `bis_smoothlandmarks.tcl` [--inp] [--out] [--factor] [--dogui]
[--pset] [--slicermode] [--loni] [--ctest] [--ctestline]
[--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug]
[--ctestcreategold] [--ctestgui]

Detailed Description: `bis_smoothlandmarks.tcl` Smoothing a curve stored as landmarks

[Inputs]

- `input.landmarks` (command line option `-inp`) : Input Landmarks

[Outputs]

- `output.landmarks` (command line option `-out`) : Output Landmarks

[Options]

- `factor` : Specify the relaxation factor for smoothing. Default value is "0.33". Allowed range is from 0.0 to 1.0

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value

is "1". Allowed values are either 0 (Off) or 1 (On)

- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues:

Authors: xenophon.papademetris@yale.edu

Chapter 15

Utility

15.1 DICOM 2 NIFTI (bis_dicom2nifti)

Description: bis_dicom2nifti.tcl – This script parses a directory containing DICOM images and creates NIFTI output files

Synopsis: bis_dicom2nifti.tcl [--indir] [--outdir] [--mode] [--name]
[--dosave] [--dodump] [--debugmode] [--dogui] [--pset]
[--slicermode] [--loni] [--ctest] [--ctestline] [--ctestsave]
[--ctesttmpdir] [--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold]
[--ctestgui]

Detailed Description: bis_dicom2nifti.tcl This script parses a directory containing DICOM images and creates NIFTI output files Has capabilities for Siemens Mosaic Format (for FMRI)

[Options]

- indir : Input directory containing DICOM Files. Default value is "".
- outdir : Output directory for NIFTI Files. Default value is "".
- mode : Postprocessing of Original Data. Default value is "NONE". Allowed values = [NONE, RAS, LPS]
- name : Study Name. Default value is "".
- dosave : If set to off no files are created. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- dodump : If set to one (default) then a dump of one of the dicom files in a series is saved. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- debugmode : Extra Header Info (if dodump=1). Default value is "NONE". Allowed values = [NONE, SIEMENS, GE]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Based on original ImageConversion script at Yale MRRC

Authors: xenophon.papademetris.yale.edu

15.2 Image Info (bis_headerinfo)

Description: bis_headerinfo.tcl – prints NIFTI/Analyze image header.

Synopsis: `bis_headerinfo.tcl` [--detail] [--dogui] [--pset] [--slicermode]
[--loni] [--ctest] [--ctestline] [--ctestsave] [--ctesttmpdir]
[--ctestexact] [--ctestthr] [--ctestdebug] [--ctestcreategold] [--ctestgui]
input_image1 input_image2 ... input_imageN

Detailed Description: `bis_headerinfo.tcl` prints NIFTI/Analyze image header. Multiple number of input files can be specified.

[Inputs]

- input_image list – specify the list of names for this at the end of the command line

[Options]

- detail : description length for header. Default value is "short". Allowed values = [short, long, full]

[Common Options]

- dogui : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- pset : Use Parameter set to set parameters. Default value is "".
- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000

- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_headerinfo.tcl`. `bis_headerdump.tcl` can be integrated upon request.

Authors: `hirohito.okuda@yale.edu`, `xenophon.papademetris@yale.edu`.

15.3 Make Batch (`bis_makebatch`)

Description: `bis_makebatch.tcl` – Creates a makefile given a batch input definition file

Synopsis: `bis_makebatch.tcl` `--setup` `--makefile` `--odir` `--doexample` `--mode` `--docheck` `--dummymode` `--dogui` `--pset` `--slicermode` `--loni` `--ctest` `--ctestline` `--ctestsave` `--ctesttmpdir` `--ctestexact` `--ctestthr` `--ctestdebug` `--ctestcreategold` `--ctestgui`

Detailed Description: `bis_makebatch.tcl` Creates a makefile given a batch input definition file

[Options]

- `setup` : specify the setup file for the batch job. Default value is "".
- `makefile` : specify the output makefile for the batch job. Default value is "".
- `odir` : specify the output directory for the batch job. Default value is "".
- `doexample` : generate an example file. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `mode` : default is BioImage Suite mode , i.e. specify inputs using `-inp`, `-inp 2` etc. If 0 lists inputs and outputs in sequence. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `docheck` : if 1 then we test if the input files exist. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `dummymode` : if 1 then we simply test the setup file but not create any output makefile/directories. Default value is "0". Allowed values are either 0 (Off) or 1 (On)

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Replaces a bunch of old style batch files

Authors: xenophon.papademetris@yale.edu.

15.4 Split 4D Image (`bis_split4dimage`)

Description: `bis_split4dimage.tcl` – extracts 3D volumes from the beginning time-frame to the ending time-frame from a 4D image.

Synopsis: `bis_split4dimage.tcl` [--inp] [--begin] [--end] [--ostem]
[--dogui] [--pset] [--slicermode] [--loni] [--ctest]
[--ctestline] [--ctestsave] [--ctesttmpdir] [--ctestexact] [--ctestthr]
[--ctestdebug] [--ctestcreategold] [--ctestgui]

Detailed Description: `bis_split4dimage.tcl` extracts 3D volumes from the beginning time-frame to the ending time-frame from a 4D image. Output files are `input_001.hdr`, `input_002.hdr` ,,, etc (or `input_001.nifti`, `input_002.nifti` ,,,). `input_001.hdr` corresponds to the begin frame. If the `-begin` and `-end` option is not specified, all the the 3D volumes are extracted.

[Inputs]

- `input_image` (command line option `-inp`) : input 4D image

[Options]

- `begin` : begin frame. Default value is "1". Allowed range is from 1 to 1000
- `end` : end frame. Default value is "1000". Allowed range is from 1 to 1000
- `ostem` : Stem of output filename, if set output files will be `ostem.frame.extension`, else the input name is used. Default value is "".

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".
- `slicermode` : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `loni` : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- `ctest` : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- `ctestline` : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- `ctestsave` : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `ctesttmpdir` : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".

- `ctestexact` : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- `ctestthr` : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- `ctestdebug` : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- `ctestcreategold` : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- `ctestgui` : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from `pxmat_split4dimage.tcl`.

Authors: `hirohito.okuda@yale.edu`, `xenophon.papademetris.yale.edu`

15.5 Surface Info (`bis_surfaceinfo`)

Description: `bis_surfaceinfo.tcl` – prints information about `.vtk` surface files.

Synopsis: `bis_surfaceinfo.tcl` `--detail` `]` `--dogui` `]` `--pset` `]` `--slicermode` `]`
`--loni` `]` `--ctest` `]` `--ctestline` `]` `--ctestsave` `]` `--ctesttmpdir` `]`
`--ctestexact` `]` `--ctestthr` `]` `--ctestdebug` `]` `--ctestcreategold` `]` `--ctestgui` `]`
`input_surface1` `input_surface2` ... `input_surfaceN`

Detailed Description: `bis_surfaceinfo.tcl` prints information about `.vtk` surface files.

[Inputs]

- `input_surface` list – specify the list of names for this at the end of the command line

[Options]

- `detail` : description length for header. Default value is "short". Allowed values = [short, long]

[Common Options]

- `dogui` : Enable the creation of a graphical user interface. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- `pset` : Use Parameter set to set parameters. Default value is "".

- slicermode : This signifies that the algorithm is being invoked by Slicer. It affects default save formats.. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- loni : Create xml output for loni pipeline and exit (1=module group,2=module). Default value is "0". Allowed range is from 0 to 2
- ctest : Enable the running of ctest automated testing. If argument is specified then the script is invoked in test mode and using the argument as the text file containing the test definitions. Default value is "0".

[Software Testing Options]

- ctestline : (Use only in software testing mode) If set to a positive integer then the only test that is run corresponds to the appropriate line in the testfile. Default value is "-1". Allowed range is from -1 to 9999
- ctestsave : (Use only in software testing mode) If enabled then save results of computation otherwise discard after testing is performed. Default value is "0". Allowed values are either 0 (Off) or 1 (On)
- ctesttmpdir : (Use only in software testing mode) Output directory to save temporary output testing files, if not set default filenames are generated from the input filenames. Default value is "".
- ctestexact : (Use only in software testing mode) If enabled then comparison is done via subtraction else correlation (images) or correspondence error (surfaces) is used. Default value is "1". Allowed values are either 0 (Off) or 1 (On)
- ctestthr : (Use only in software testing mode) Threshold for subtraction or correlation. Default value is "0.002". Allowed range is from 0 to 100000
- ctestdebug : (Use only in software testing mode) If set to non empty then a textfile is created with debug output. Default value is "".
- ctestcreategold : (Use only in software testing mode) If set to 9999 then the test saves its result as a gold standard. Use with extreme care. Default value is "0". Allowed range is from 0 to 9999
- ctestgui : (Use only in software testing mode) If set to 1 then the testing is done in GUI mode and the comparison is based on the viewer output. Default value is "0". Allowed range is from 0 to 1

Backward Compatibility Issues: Reimplemented from pxmat_surfaceinfo.tcl

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Appendix A

Alphabetical Algorithm List

1. bis_ISAS (ISAS) – see page 177
2. bis_ISASHN (Diff SPECT with ISASHN) – see page 179
3. bis_biasfield (Bias Field) – see page 69
4. bis_blendimage (Image Blend) – see page 71
5. bis_castimage (Cast Image) – see page 12
6. bis_checkerboardimage (CheckerBoard) – see page 72
7. bis_cleansurface (Clean Surface) – see page 103
8. bis_clipsurface (Clip Surface) – see page 104
9. bis_clusterthresholdimage (Cluster Threshold) – see page 13
10. bis_colorblendimage (Color Blend Image) – see page 74
11. bis_combineframes (Combine Frames) – see page 54
12. bis_combineimages (Combine Set of Images) – see page 99
13. bis_combinetransformations (Combine Transformations) – see page 125
14. bis_compute correlations (Compute Correlations) – see page 159
15. bis_computedisplacementfield (Compute Displacement Field) – see page 127
16. bis_computeglm (Compute GLM Regression) – see page 161
17. bis_computenormals (Compute Normals) – see page 106
18. bis_computeoverlap (Compute Overlap) – see page 128
19. bis_computesimilarity (Compute Similarity) – see page 130
20. bis_computetensor (Compute Tensor) – see page 183
21. bis_connect (Connect) – see page 107
22. bis_convolveimage (Convolve Image) – see page 15
23. bis_create4dimage (Concatenate Set of 3D Images) – see page 100
24. bis_createoverlayimage (Create Image Overlay) – see page 76
25. bis_cropimage (Crop Image) – see page 17
26. bis_csfwmotioncorr (CSF WM Motion Correction) – see page 78
27. bis_curvatures (Curvatures) – see page 109
28. bis_cylindricalcropimage (C-Blank Image) – see page 19
29. bis_decimate (Decimate) – see page 111
30. bis_delaunay3D (Delaunay Triangulation) – see page 112
31. bis_dicom2nifti (DICOM 2 NIFTI) – see page 198
32. bis_distancemapimage (Signed DistanceMap) – see page 21

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- 33. `bis.edgedetectimage` (Edge Detection) – see page 22
 - 34. `bis.exponentialfitimage` (Exponential Fit Image) – see page 55
 - 35. `bis.extractobjectmap` (Extract Objectmap) – see page 114
 - 36. `bis.extractsurface` (Extract Surface) – see page 115
 - 37. `bis.fdr` (Compute FDR) – see page 80
 - 38. `bis.fftimage` (Fourier Transform) – see page 24
 - 39. `bis.flipimage` (Flip Image) – see page 25
 - 40. `bis.frangivesselness` (Frangi Vesselness) – see page 189
 - 41. `bis.headerinfo` (Image Info) – see page 199
 - 42. `bis.imagecompare` (Compute Image Comparison) – see page 81
 - 43. `bis.imagedilate` (Dilate/Erode Filter) – see page 27
 - 44. `bis.imagemathoperations` (Math Operations) – see page 83
 - 45. `bis.imagemedian` (Median Filter) – see page 28
 - 46. `bis.imageremoveframes` (Remove Frames) – see page 57
 - 47. `bis.interleave` (Interleave Frames) – see page 59
 - 48. `bis.intsegment` (Intensity Segmentation) – see page 151
 - 49. `bis.levelset` (Tissue Levelset) – see page 153
 - 50. `bis.linearintensityregister` (Linear Registration) – see page 132
 - 51. `bis.linearpointregister` (Linear RPM) – see page 134
 - 52. `bis.listthresholdimage` (Threshold By List) – see page 30
 - 53. `bis.logimage` (Log Image) – see page 32
 - 54. `bis.makebatch` (Make Batch) – see page 201
 - 55. `bis.manualregistration` (Manual Registration) – see page 136
 - 56. `bis.manualreslice` (Manual Reslice) – see page 85
 - 57. `bis.maskimage` (Mask Image) – see page 86
 - 58. `bis.matrixcorrelation` (Matrix Correlation) – see page 162
 - 59. `bis.mediantemporalsmoothimage` (Median Temporal Smooth) – see page 60
 - 60. `bis.multisubjectfmri` (MultiSubject fMRI) – see page 164
 - 61. `bis.newreorientimage` (ReOrient Image) – see page 33
 - 62. `bis.nonlineardistortioncorrection` (Distortion Cor) – see page 138
 - 63. `bis.nonlinearintensityregister` (NonLinear Reg) – see page 140
 - 64. `bis.nonlinearpointregister` (NonLinear RPM) – see page 143
 - 65. `bis.nonlinearsmoothimage` (Anisotropic Diffusion) – see page 35
 - 66. `bis.piecewiseimagemap` (PiecewiseMap) – see page 36
 - 67. `bis.preprocessimage` (4D Preprocess Image) – see page 62
 - 68. `bis.proportionalscale` (Proportional Scale Image) – see page 39
 - 69. `bis.qianvesselness` (Qian Vesselness) – see page 191
 - 70. `bis.regularizeobjectmap` (Regularize Objectmap) – see page 41
 - 71. `bis.relabelimage` (Relabel Header) – see page 42
 - 72. `bis.removeslicemean` (Remove Slice Mean) – see page 64
 - 73. `bis.remove temporal drift` (Temporal Drift Removal) – see page 65
 - 74. `bis.reorientimage` (Reorient Image) – see page 44
 - 75. `bis.resampleimage` (Resample Image) – see page 45
 - 76. `bis.resamplelandmarks` (Resample Landmarks) – see page 194
 - 77. `bis.resliceimage` (Image Reslice) – see page 88
 - 78. `bis.reslicetensor` (Tensor Reslice) – see page 185
 - 79. `bis.rfftimage` (Inv Fourier Xform) – see page 47
 - 80. `bis.roimean` (ROI Mean) – see page 90

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81. `bis_rtopvalue` (R-value to 1-p value) – see page 165
 82. `bis_rtotmap` (R-value to T-Score) – see page 167
 83. `bis_seedcorrelation` (Seed Correlation) – see page 168
 84. `bis_serialedemonmousereg` (Serial Demons Mouse Registration) – see page 145
 85. `bis_shiftscaleimage` (Shift/Scale Image) – see page 49
 86. `bis_singleimagemathoperations` (Math Operations) – see page 91
 87. `bis_singlejacobian` (Compute Jacobian) – see page 146
 88. `bis_singlesubjectfmri` (MultiSubject fMRI) – see page 170
 89. `bis_sliceinhomogeneity` (Slice Inhomogeneity) – see page 93
 90. `bis_smoothimage` (Smooth Image) – see page 50
 91. `bis_smoothlandmarks` (Smooth Landmarks) – see page 195
 92. `bis_smoothsurface` (Smooth Surface) – see page 117
 93. `bis_spectrf` (Calculate RF) – see page 181
 94. `bis_split4dimage` (Split 4D Image) – see page 202
 95. `bis_stitchimage` (Stitch images) – see page 95
 96. `bis_stripskull` (Strip Skull) – see page 155
 97. `bis_subdivide` (Subdivide) – see page 119
 98. `bis_surfaceinfo` (Surface Info) – see page 204
 99. `bis_temporalsmoothimage` (Temporal Smooth) – see page 67
 100. `bis_tensoranalysis` (Compute DTI Maps) – see page 187
 101. `bis_thresholdimage` (Threshold Image) – see page 52
 102. `bis_thresholdpoints` (Threshold points) – see page 120
 103. `bis_tmaptopvalue` (T-score to P-value) – see page 172
 104. `bis_tmaptozscore` (T-score to Z-score) – see page 173
 105. `bis_transformsurface` (Transform Surface) – see page 122
 106. `bis_triangulate` (Triangulate) – see page 123
 107. `bis_ttest` (Compute T-Test) – see page 96
 108. `bis_visualizetransformation` (Visualize Transformation) – see page 148
 109. `bis_zscoretopvalue` (Zmap to pvalue) – see page 175