montage$_{w}rapper Documentation$

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Part I

Introduction

This Astropy-affiliated package provides a python wrapper to the Montage Astronomical Image Mosaic Engine, including both functions to access individual Montage commands, and high-level functions to facilitate mosaicking and re-projecting.

Part II

Download

The latest stable release can be downloaded from here.

Part III

Installation

This package is a wrapper, not a replacement, for the IPAC Montage mosaicking software. Therefore, Montage will need to be downloaded from http://montage.ipac.caltech.edu. Once you have downloaded the latest release on Montage from that website, the installation should look like:

```
tar xvzf Montage_v3.3.tar.gz
cd Montage_v3.3
make
```

then move the `Montage_v3.3` directory to wherever you would like to keep the installation, and add `<installation_dir>/Montage_v3.3/bin` to your `$PATH`, where `<installation_dir>` is the directory inside which you put `Montage_v3.3` (Montage does not support `make install`). To check that Montage is correctly installed, you can type:

```
mAdd
```

If you see something like:

```
[struct stat="ERROR", msg="Usage: mAdd [-p imgdir] [-n(o-areas)] [-a mean|median|count] [-e(xact-size)] [-d level] [-s st
```

then the installation succeeded. Otherwise, if you see:

```
mAdd: command not found
```

then you will need to make sure that the `Montage_v3.3/bin` contains commands like `mAdd`, and that the directory is correctly in your `$PATH`.

Once the IPAC Montage package is installed, you can install the Python wrapper with:

```
tar xvzf montage-wrapper-x.x.x.tar.gz
cd montage-wrapper-x.x.x
python setup.py install
```

(replacing `x.x.x` with the actual version number). The only dependencies are numpy and astropy.

Part IV

Using `montage_wrapper`

CHAPTER 1

Montage commands

The Montage wrapper is imported using:

```
>>> import montage_wrapper
```

or, for clarity:

```
>>> import montage_wrapper as montage
```

All Montage commands (except `mJPEG`, `mMakeImg`, and `mTileImage`) are accessible via Python functions. For example, to access `mProject`, use:

```
>>> montage.mProject(...)
```

and see `mProject()` for available options. Each Montage command returns a `Struct` object that contains information/diagnostics. The following example shows how to use the Montage command wrappers, and how to access the diagnostics:

```
>>> montage.mArchiveList('2MASS', 'K', 'm31', 0.5, 0.5, 'm31_list.tbl')
count : 18
stat : OK
>>> montage.mMakeHdr('m31_list.tbl', 'header.hdr', north_aligned=True)
count : 18
lat4 : 41.744136
stat : OK
lat1 : 40.912238
lat3 : 41.744136
latsize : 0.831951
clon : 10.717965
lonsize : 0.830562
posang : 0.0
lon4 : 11.274528
lat2 : 40.912238
lon1 : 11.267467
clat : 41.32951
lon2 : 10.168464
lon3 : 10.161403
>>> s = montage.mMakeHdr('m31_list.tbl', 'header.hdr', north_aligned=True)
>>> s.stat
'OK'
>>> s.lon1
11.267467
```

See *Reference/API* for a full list of available commands and documentation.

CHAPTER 2

High-level functions

In addition to wrappers to the individual Montage commands, the following high-level functions are available:

- `reproject`: reproject a FITS file
- `reproject_hdu`: reproject an FITS HDU object
- `mosaic`: mosaic all FITS files in a directory

For example, to mosaic all FITS files in a directory called `raw` using background matching, use:

```
>>> montage.mosaic('raw', 'mosaic', background_match=True)
```

In this specific example, a mosaic header will automatically be constructed from the input files.

For more details on how to use these, see the *Reference/API* section.

CHAPTER 3

MPI

A few Montage commands can be run using MPI for parallelization (see here). For MPI-enabled commands (such as `mProjExec`), the use of MPI is controlled via the mpi= argument. For example, to call `mProjExec` using MPI, call `montage.mProjExec(..., mpi=True)` (rather than `montage.mProjExecMPI`, which does not exist). Note however that this requires the MPI versions of the Montage commands to be installed (which is not the case by default).

Different MPI installations require different commands (e.g. `mpirun` vs `mpiexec`) as well as different options, so it is possible to customize the MPI command:

```
>>> import montage_wrapper as montage
>>> montage.set_mpi_command('mpiexec -n {n_proc} {executable}')
```

The command string should include `{n_proc}`, which will be replaced by the number of proceses, and `{executable}`, which will be replaced by the appropriate Montage executable. The current MPI command can be accessed with:

```
>>> from montage_wrapper.mpi import MPI_COMMAND
>>> MPI_COMMAND
'mpiexec -n {n_proc} {executable}'
```

Part V

Reference/API

CHAPTER 4

montage_wrapper.wrappers Module

4.1 Functions

mProject_auto(*args, **kwargs)	Run mProject, automatically selecting whether to run mProject or mProjectPP if p
mosaic(input_dir, output_dir[, header, ...])	Combine FITS files into a mosaic
reproject(in_images, out_images[, header, ...])	General-purpose reprojection routine.
reproject_cube(in_image, out_image[, ...])	Cube reprojection routine.
reproject_hdu(in_hdu, **kwargs)	Reproject an image (HDU version)

4.1.1 mProject_auto

montage_wrapper.wrappers.**mProject_auto**(**args*, ***kwargs*)

Run mProject, automatically selecting whether to run mProject or mProjectPP if possible (fast plane-to-plane projection). For details on required and optional arguments, see help(mProject).

4.1.2 mosaic

montage_wrapper.wrappers.**mosaic**(*input_dir*, *output_dir*, *header=None*, *image_table=None*, *mpi=False*, *n_proc=8*, *background_match=False*, *imglist=None*, *combine='mean'*, *exact_size=False*, *cleanup=True*, *bitpix=-32*, *level_only=True*, *work_dir=None*, *background_n_iter=None*, *subset_fast=False*, *hdu=None*)

Combine FITS files into a mosaic

Parameters

input_dir : str

The directory containing the input FITS files

output_dir : str

The output directory to create

header : str, optional

The header to project to. If this is not specified, then an optimal header is chosen.

image_table : str, optional

The table file containing the list of input images. This can be specified to avoid recomputing it every time a mosaic is made from the same set of input files.

mpi : bool, optional

Whether to use MPI whenever possible (requires the MPI-enabled Montage binaries to be installed).

n_proc : int, optional

The number of processes to use if `mpi` is set to `True`

background_match : bool, optional

Whether to include a background-matching step

imglist : str, optional

A list of images to use (useful if not all the files inside `input_dir` should be combined).

combine : str, optional

How to combine the images - this should be one of `'mean'`, `'median'`, or `'count'`.

exact_size : bool, optional

Whether the output mosaic should match the input header exactly, or whether the mosaic should be trimmed if possible.

cleanup : bool, optional

Whether to remove any temporary directories used for mosaicking

bitpix : int, optional

BITPIX value for the ouput FITS file (default is -32). Possible values are: 8 (character or unsigned binary integer), 16 (16-bit integer), 32 (32-bit integer), -32 (single precision floating point), -64 (double precision floating point).

level_only : bool, optional

When doing background matching, whether to only allow changes in the level of frames, not the slope.

work_dir : str, optional

The temporary directory to use for the mosaicking. By default, this is a temporary directory in a system-defined location, but it can be useful to specify this manually for debugging purposes.

background_n_iter : int, optional

Number of iterations for the background matching (defaults to 5000). Can be between 1 and 32767.

subset_fast : bool, optional

Whether to use the fast mode for mSubset

hdu: int, optional

Which HDU to use when mosaicing

4.1.3 reproject

montage_wrapper.wrappers.**reproject**(*in_images*, *out_images*, *header=None*, *bitpix=None*, *north_aligned=False*, *system=None*, *equinox=None*, *factor=None*, *common=False*, *exact_size=False*, *hdu=None*, *cleanup=True*, *silent_cleanup=False*)

General-purpose reprojection routine.

If one input/output image is specified, and the header argument is set, the routine is equivalent to using mProject or mProjectPP. If header= is not set, a new header is computed by taking into account the north_aligned, system, and equinox arguments (if set).

If tuples of input/output images are specified, the tuples need to have the same number of elements. If header= is specified, all images are projected to this common projection. If header= is not specified, then a new header is computed a new header is computed by taking into account the north_aligned, system, and equinox arguments (if set). If common=False, then a header is computed for each individual image, whereas if common=True, an optimal header is computed for all images.

Parameters

in_images : str or list

Path(s) of input FITS file(s) to be reprojected.

out_images : str or list

Path(s) of output FITS file(s) to be created.

header : str, optional

Path to the header file to use for re-projection.

bitpix : int, optional

BITPIX value for the ouput FITS file (default is -64). Possible values are: 8 (character or unsigned binary integer), 16 (16-bit integer), 32 (32-bit integer), -32 (single precision floating point), -64 (double precision floating point).

north_aligned : bool, optional

Align the pixel y-axis with North

system : str, optional

Specifies the coordinate system Possible values are: 'EQUJ', 'EQUB', 'ECLJ', 'ECLB', 'GAL', 'SGAL'

equinox : str, optional

If a coordinate system is specified, the equinox can also be given in the form 'YYYY'. Default is 'J2000'.

factor : float, optional

Drizzle factor (see `mProject`)

exact_size : bool, optional

Whether to reproject the image(s) to the exact header specified (i.e. whether cropping is unacceptable).

hdu : int, optional

The HDU to use in the file(s)

silent_cleanup : bool, optional

Hide messages related to tmp directory removal

common : str, optional

Compute a common optimal header for all images (only used if header=None and if multiple files are being reprojected)

4.1.4 reproject_cube

montage_wrapper.wrappers.**reproject_cube**(*in_image*, *out_image*, *header=None*, *bitpix=None*, *north_aligned=False*, *system=None*, *equinox=None*, *factor=None*, *common=False*, *cleanup=True*, *clobber=False*, *silent_cleanup=True*, *hdu=0*)

Cube reprojection routine.

If one input/output image is specified, and the header argument is set, the routine is equivalent to using mProject or mProjectPP. If header= is not set, a new header is computed by taking into account the north_aligned, system, and equinox arguments (if set).

Parameters

in_image : str

Path of input FITS file to be reprojected.

out_image : str

Path of output FITS file to be created.

header : str, optional

Path to the header file to use for re-projection.

bitpix : int, optional

BITPIX value for the ouput FITS file (default is -64). Possible values are: 8 (character or unsigned binary integer), 16 (16-bit integer), 32 (32-bit integer), -32 (single precision floating point), -64 (double precision floating point).

north_aligned : bool, optional

Align the pixel y-axis with North

system : str, optional

Specifies the coordinate system Possible values are: 'EQUJ', 'EQUB', 'ECLJ', 'ECLB', 'GAL', 'SGAL'

equinox : str, optional

If a coordinate system is specified, the equinox can also be given in the form 'YYYY'. Default is 'J2000'.

factor : float, optional

Drizzle factor (see `mProject`)

clobber : bool, optional

Overwrite the data cube if it already exists?

silent_cleanup : bool, optional

Hide messages related to tmp directory removal (there will be one for each plane of the cube if set to False)

hdu: int

Defaults to zero. Selects which HDU to use from the FITS file.

4.1.5 reproject_hdu

montage_wrapper.wrappers.**reproject_hdu**(*in_hdu*, ***kwargs*)

Reproject an image (HDU version)

Parameters

in_hdu : PrimaryHDU or ImageHDU

Input FITS HDU to be reprojected.

Notes

Additional keyword arguments are passed to reproject()

CHAPTER 5

montage_wrapper.commands Module

5.1 Functions

mAdd(images_table, template_header, out_image)	Coadd the reprojected images in an input list to form an output mosaic with Fl
mAddExec(images_table, template_header, ...)	Builds a series of outputs (which together make up a tiled output) through mul
mArchiveExec(region_table[, debug_level])	Given a table of archive images (generated by mArchiveList), calls mArchiveG
mArchiveGet(remote_ref, local_file[, debug, raw])	Retrieve a single FITS image from a remote archive, using a basic URL GET
mArchiveList(survey, band, ...)	Given a location on the sky, archive name, and size in degrees, contact the IRS
mBackground(in_image, out_image, A, B, C[, ...])	Remove a background plane from a FITS image.
mBackground_tab(in_image, out_image, ...[, ...])	Remove a background plane from a FITS image.
mBestImage(images_table, ra, dec[, debug])	Given a list of images and a position on the sky, determine which image cover
mBgExec(images_table, corrections_table, ...)	Runs mBackground on all the images in a metadata table, using the correction
mBgModel(images_table, fits_table, ...[, ...])	mBgModel is a modelling/fitting program. It uses the image-to-image
mCatMap(in_table, out_image, template_header)	mCatMap is a point-source imaging program. The user defines a general
mConvert(in_image, out_image[, debug_level, ...])	mConvert changes the datatype of an image. When converting to floating
mCoverageCheck(in_table, out_table, mode[, ...])	mCoverageCheck can be used to subset an image metadata table (containing
mDiff(in_image_1, in_image_2, out_image, ...)	mDiff calculates a simple difference between a single pair of overlapping
mDiffExec(diffs_table, template_header, diff_dir)	Runs mDiff on all the pairs identified by mOverlaps.
mDiffFitExec(diffs_table, fits_table, diff_dir)	Using the table of overlaps found by mOverlaps, mDiffFitExec runs both mDi
mExec(survey, band[, raw_dir, n_tile_x, ...])	The mExec module is a mosaicking executive for 2MASS, SDSS, and DSS da
mFitExec(diffs_table, fits_table, diff_dir)	Runs mFitplane on all the difference images identified by mOverlaps and gene
mFitplane(in_image[, border, debug_level, ...])	Uses least squares to fit a plane (excluding outlier pixels) to an image.
mFixNaN(in_image, out_image[, debug_level, ...])	Converts NaNs found in the image to some other value (given by the user), or
mFlattenExec(images_table, flat_dir[, ...])	Runs both mFitPlane and mBackground on a set of images.
mGetHdr(in_image, img_header[, debug, hdu, ...])	Reads in the header from a FITS image and prints it out to a text file.
mHdr(object_or_location, width, out_file[, ...])	Connects to the IRSA service HdrTemplate to create a header template based
mHdrCheck(in_image[, status_file])	mHdrCheck reads in the header from a FITS image (or an ASCII header
mHdrtbl(directory, images_table[, ...])	mHdrtbl operates in a fashion similar to mImgtbl, but is used on a set of
mImgtbl(directory, images_table[, ...])	mImgtbl extracts the FITS header geometry information from a set of files
mMakeHdr(images_table, template_header[, ...])	From a list of images to be mosaicked together, mMakeHdr generates the FITS
mOverlaps(images_table, diffs_table[, ...])	Analyze an image metadata table to determine a list of overlapping images.
mPix2Coord(template_header, ixpix, jypix[, ...])	Takes an image FITS header template and a pixel (x,y) coordinate, and output
mProjExec(images_table, template_header, ...)	An executive which runs mProject (or, if possible for the input/output projecti
mProject(in_image, out_image, template_header)	mProject reprojects a single image to the scale defined in a FITS header
mProjectPP(in_image, out_image, template_header)	mProjectPP reprojects a single image to the scale defined in an alternate
mPutHdr(in_image, out_image, template_header)	Replaces the header of the input file with one supplied by the user.
mRotate(in_image, out_image[, debug_level, ...])	Rotates a FITS image by an arbitrary angle.

Table 5.1 – continued from previous pag

mShrink(in_image, out_image, factor[, ...])	A utility for reducing the size of a FITS file, by averaging blocks of pixels.
mSubimage(in_image, out_image, ra, dec, xsize)	Creates a subimage (or "cutout") of a FITS file.
mSubimage_pix(in_image, out_image, ...[, ...])	Creates a subimage (or "cutout") of a FITS file ('pixel' mode)
mSubset(images_table, template_header, ...)	Generates a table of images that is a subset of the input table, containing only
mTANHdr(orig_header, new_header[, debug, ...])	Analyzes a template file and determines if there would be an adequate equival
mTblSort(in_table, column_name, out_table[, ...])	Sorts a table on numeric values.
mTileHdr(orig_header, new_header, n_x, n_y, ...)	Takes a header template file and creates another which represents one of a reg
mTileImage(in_image, tiles_x, tiles_y[, ...])	mTileImage splits up an image into a given number of tiles.

5.1.1 mAdd

montage_wrapper.commands.**mAdd**(*images_table*, *template_header*, *out_image*, *img_dir=None*, *no_area=False*, *type=None*, *exact=False*, *debug_level=None*, *status_file=None*, *mpi=False*, *n_proc=8*)

Coadd the reprojected images in an input list to form an output mosaic with FITS header keywords specified in a header file. Creates two output files, one containing the coadded pixel values, and the other containing coadded pixel area values. The pixel area values can be used as a weighting function if the output pixel values are themselves to be coadded with other projected images, and may also be used in validating the fidelity of the output pixel values.

Parameters

images_table : str

ASCII table (generated by mImgtbl) containing metadata for all images to be coadded.

template_header : str

FITS header template to be used in generation of output FITS

out_image : str

Name of output FITS image.

img_dir : str, optional

Specifies path to directory containing reprojected images. If the img_dir option is not included, mAdd will look for the input images in the current working directory.

no_area : bool, optional

Co-addition ignores weighting by pixel areas and performs coaddition based only on pixel postions. Will not output an area image for the output image.

type : str, optional

Select type of averaging to be done on accumulated pixel values (either mean or median). To generate a map showing counts of how many times each pixel was overlapped by the input images, use count.

exact : bool, optional

Enables exact size mode. The output image will match the header template exactly, instead of shrinking the output to fit the data.

debug_level : int, optional

Turns on debugging to the specified level (1-3).

status_file : str, optional

mAdd output and errors will be written to status_file instead of stdout.

mpi : bool, optional

If set to True, will use the MPI-enabled versions of the Montage executable.

n_proc : int, optional

If mpi is set to True, n_proc is the number of processes to run simultaneously (default is 8)

5.1.2 mAddExec

montage_wrapper.commands.**mAddExec**(*images_table*, *template_header*, *tile_dir*, *out_image*, *img_dir=None*, *no_area=False*, *type=None*, *exact=False*, *debug_level=None*, *status_file=None*, *mpi=False*, *n_proc=8*)

Builds a series of outputs (which together make up a tiled output) through multiple executions of the mAdd modules.

Parameters

images_table : str

ASCII table (generated by mImgtbl) containing metadata for all images to be coadded.

template_header : str

FITS header template to be used in generation of output FITS

tile_dir : str

Directory to contain output tile images and header templates

out_image : str

Prefix for output tile images

img_dir : str, optional

Specifies path to directory containing reprojected images. If the img_dir option is not included, mAdd will look for the input images in the current working directory.

no_area : bool, optional

Co-addition ignores weighting by pixel areas and performs coaddition based only on pixel postions. Will not output an area image for the output image.

type : str, optional

Select type of averaging to be done on accumulated pixel values (either mean or median).

exact : bool, optional

Enables exact size mode. The output image will match the header template exactly, instead of shrinking the output to fit the data.

debug_level : int, optional

Turns on debugging to the specified level (1-3).

status_file : str, optional

mAdd output and errors will be written to status_file instead of stdout.

mpi : bool, optional

If set to True, will use the MPI-enabled versions of the Montage executable.

n_proc : int, optional

If mpi is set to True, n_proc is the number of processes to run simultaneously (default is 8)

5.1.3 mArchiveExec

montage_wrapper.commands.**mArchiveExec**(*region_table*, *debug_level=None*)

Given a table of archive images (generated by mArchiveList), calls mArchiveGet on each one in sequence to retrieve all the files into the current directory.

Parameters

region_table : str

Table of archive images, generated by mArchiveList.

debug_level : int, optional

Prints out additional debugging information; in this version, the only supported level is 1.

5.1.4 mArchiveGet

montage_wrapper.commands.**mArchiveGet**(*remote_ref*, *local_file*, *debug=False*, *raw=False*)

Retrieve a single FITS image from a remote archive, using a basic URL GET but with a structured output.

Parameters

remote_ref : str

URL of remote FITS file to retrieve (should be in quotes). See mArchiveList for more information.

local_file : str

Full path/filename of the retrieved file.

debug : bool, optional

Print additional debugging information.

raw : bool, optional

"Raw" mode - use a raw HTTP GET (no "HTTP/1.1" etc in the header); necessary for communication with some servers.

5.1.5 mArchiveList

montage_wrapper.commands.**mArchiveList**(*survey*, *band*, *object_or_location*, *width*, *height*, *out_file*)

Given a location on the sky, archive name, and size in degrees, contact the IRSA server to retrieve a list of archive images. The list contains enough information to support mArchiveGet downloads.

Parameters

survey : str

Can be one of: 2MASS DSS SDSS DPOSS

band : str

Case insensitive - can be one of: (2MASS) j, h, k (SDSS) u, g, r, i, z (DPOSS) f, j, n (DSS) DSS1, DSS1R, DSS1B, DSS2, DSS2B, DSS2R, DSS2IR

object_or_location : str

Object name or coordinate string to be resolved by NED (if string includes spaces, must be surrounded by double quotes)

width : float

Width of area of interest, in degrees

height : float

Height of area of interest, in degrees

out_file : str

Path to output table

5.1.6 mBackground

montage_wrapper.commands.**mBackground**(*in_image*, *out_image*, *A*, *B*, *C*, *debug_level=None*, *no_area=False*, *status_file=None*)

Remove a background plane from a FITS image. The background correction applied to the image is specified as Ax+By+C, where (x,y) is the pixel coordinate using the image center as the origin, and (A,B,C) are the background plane parameters specified as linear coefficients. To run in 'table' mode, see mBackground_tab.

Parameters

in_image : str

Input FITS file

out_image : str

Output FITS file

A, B, C : str

Corrections (as given by mFitplane or mFitExec)

debug_level : int, optional

Turns on debugging to the specified level.

no_area : bool, optional

Indicates that no area images are present (assumes equal weighting for each data pixel)

status_file : str, optional

mBackground output and errors will be written to status_file instead of stdout.

5.1.7 mBackground_tab

montage_wrapper.commands.**mBackground_tab**(*in_image*, *out_image*, *images_table*, *corrections_table*, *debug_level=None*, *no_area=False*, *status_file=None*)

Remove a background plane from a FITS image. The background correction applied to the image is specified as Ax+By+C, where (x,y) is the pixel coordinate using the image center as the origin, and (A,B,C) are the background plane parameters specified as linear coefficients. This method runs mBackground_tab in 'table' mode.

Parameters

in_image : str

Input FITS file

out_image : str

Output FITS file

images_table : str

Image metadata table to retrieve the filenames of images.

corrections_table : str

Table of corrections (from mFitplane and mFitExec) to apply to the corresponding image (from images_table).

debug_level : int, optional

Turns on debugging to the specified level.

no_area : bool, optional

Indicates that no area images are present (assumes equal weighting for each data pixel)

status_file : str, optional

mBackground_tab output and errors will be written to status_file instead of stdout.

5.1.8 mBestImage

montage_wrapper.commands.**mBestImage**(*images_table*, *ra*, *dec*, *debug=False*)

Given a list of images and a position on the sky, determine which image covers the location "best" (i.e., the one where the position is farthest from the nearest edge).

Parameters

images_table : str

Input table of image metadata (as generated by mImgtbl).

ra : float

RA of location of interest (in degrees)

dec : float

Declination of location of interest (in degrees)

debug_level : int, optional

Turn on debugging to the specified level (1 or 2)

5.1.9 mBgExec

montage_wrapper.commands.**mBgExec**(*images_table*, *corrections_table*, *corr_dir*, *proj_dir=None*, *status_file=None*, *debug=False*, *no_area=False*, *mpi=False*, *n_proc=8*)

Runs mBackground on all the images in a metadata table, using the corrections generated by mFitExec.

Parameters

images_table : str

Image metadata table generated by mImgtbl.

corrections_table : str

Table of corrections generated by mFitExec

corr_dir : str

Directory where output images should be written

proj_dir : str, optional

Specifies the path to the directory containing the projected images.

status_file : str, optional

Writes output message to status_file instead of to stdout

debug : bool, optional

Turns on debugging

no_area : bool, optional

Indicates that no area images are present (assumes equal weighting for each pixel)

mpi : bool, optional

If set to True, will use the MPI-enabled versions of the Montage executable.

n_proc : int, optional

If mpi is set to True, n_proc is the number of processes to run simultaneously (default is 8)

5.1.10 mBgModel

montage_wrapper.commands.**mBgModel**(*images_table*, *fits_table*, *corrections_table*, *n_iter=None*, *level_only=False*, *debug_level=None*, *ref_img=None*, *status_file=None*)

mBgModel is a modelling/fitting program. It uses the image-to-image difference parameter table created by mFitExec to interactively determine a set of corrections to apply to each image in order to achieve a "best" global fit.

Parameters

images_table : str

Image metadata table generated by mImgtbl.

fits_table : str

Plane fitting table generated by mFitExec.

corrections_table : str

Output table of background corrections

n_iter : int, optional

Number of iterations (without option, defaults to 5000). Can be between 1 and 32767.

level_only : bool, optional

Calculate level adjustments only (ie, don't attempt to match the slopes)

debug_level : int, optional

Turns on debugging to the specified level (1-3).

ref_img : str, optional

Turns on additional debugging for the nth image in images_table.

status_file : str, optional

mBgModel output and errors are written to status_file instead of to stdout.

5.1.11 mCatMap

montage_wrapper.commands.**mCatMap**(*in_table*, *out_image*, *template_header*, *column=None*, *ref_mag=None*, *debug_level=None*, *size=None*)

mCatMap is a point-source imaging program. The user defines a general output FITS image, and its pixels are populated from a table of point sources. The source fluxes (or just source counts) from the table are added into the appropriate pixel to create an output image.

Parameters

in_table : str

Input table of source metadata.

out_image : str

Path of output FITS file.

template_header : str

ASCII header template defining output FITS file.

column : str, optional

Name of the table column that contains flux levels. If not specified, pixels will be populated with source counts rather than summed flux values.

ref_mag : float, optional

Set a reference magnitude to use when calculating fluxes.

debug_level : int, optional

Turn on debugging to the specified level (1-3)

size : int, optional

Set a spread size for point sources (default is to use no spread). Allowed values are 3 or 5.

5.1.12 mConvert

montage_wrapper.commands.**mConvert**(*in_image*, *out_image*, *debug_level=None*, *status_file=None*, *bitpix=None*, *min_val=None*, *max_val=None*, *blank_value=None*)

mConvert changes the datatype of an image. When converting to floating point, no additional information is needed. However, when converting from higher precision (e.g. 64-bit floating point) to lower (e.g. 16-bit integer), scaling information is necessary. This can be given explicitly by the user or guessed by the program.

Parameters

in_image : str

Input image filename

out_image : str

Output image filename.

debug_level : int, optional

Turns on debugging to the specified level (1-3).

status_file : str, optional

mBgModel output and errors are written to status_file instead of to stdout.

bitpix : int, optional

BITPIX value for the ouput FITS file (default is -64). Possible values are: 8 (character or unsigned binary integer), 16 (16-bit integer), 32 (32-bit integer), -32 (single precision floating point), -64 (double precision floating point).

min_val : int, optional

Pixel data value in the input image which should be treated as a minimum (value of 0) in the output image when converting from floating point to integer (default for BITPIX 8: 0; BITPIX 16: -32767; BITPIX 32: -2147483647

max_val : int, optional

Pixel data value in the input image which should be treated as a maximum (value of 255 or 32768) in the output image when converting from floating point to integer (Default for BITPIX 8: 255; BITPIX 16: 32768; BITPIX 32: 2147483648)

blank_value : int, optional

If converting down to an integer scale: value to be used in the output image to represent blank pixels (NaN) from the input image. Default value is min_val.

5.1.13 mCoverageCheck

montage_wrapper.commands.**mCoverageCheck**(*in_table*, *out_table*, *mode*, *polygon=None*, *ra=None*, *dec=None*, *width=None*, *height=None*, *rotation=None*, *radius=None*, *header=None*, *status_file=None*)

mCoverageCheck can be used to subset an image metadata table (containing FITS/WCS information or image corners) by determining which records in the table represent images that overlap with a region definition (box or circle in the sky) given on the command line.

Parameters

in_table : str

Input metadata table.

out_table : str

Output metadata table, to contain subset of in_table.

mode : str

How to check for coverage:

- 'points': use a polygon with points specified by polygon=
- 'box': use a rectangular box with center given by ra= and dec=, and the width given by width=. Optionally, the height and rotation can be given by height= and rotation=
- 'circle': use a circle with center given by ra= and dec= and radius given by radius=
- 'point': use a point given by ra= and dec=
- 'header': use a header file given by header=

polygon : list

A polygon which should be given as [(ra1, dec1), (ra2, dec2), ..., (raN, decN)].

ra : float, optional

The right ascension of the box, circle, or point

dec : float, optional

The declination of the box, circle, or point

width : float, optional

The width of the box

height : float, optional

The height of the box

rotation : float, optional

The rotation of the box

radius : float, optional

The radius of the circle

header : str, optional

A header file

status_file : str, optional

Output and errors are sent to status_file instead of to stdout

5.1.14 mDiff

montage_wrapper.commands.**mDiff**(*in_image_1*, *in_image_2*, *out_image*, *template_header*, *debug_level=None*, *no_area=False*, *status_file=None*)

mDiff calculates a simple difference between a single pair of overlapping images. This is meant for use on reprojected images where the pixels already line up exactly. mDiff analyzes an image metadata table to determine a list of overlapping images. Each image is compared with every other image to determine all overlapping image pairs. A pair of images are deemed to overlap if any pixel around the perimeter of one image falls within the boundary of the other image.

Parameters

in_image_1 : str

First input FITS file (Also needs area image in1_area_image, or use the no_area option)

in_image_2 : str

Second input FITS file.(Also needs area image in2_area_image, or use the no_area option)

out_image : str

Difference FITS image to be generated.

template_header : str

FITS header template used to generate output image.

debug_level : int, optional

Turns on debugging to the specified level (1-4).

no_area : bool, optional

No-area-images option. Creates difference image without requiring pixel area FITS image

status_file : str, optional

Output and errors are sent to status_file instead of to stdout

5.1.15 mDiffExec

montage_wrapper.commands.**mDiffExec**(*diffs_table*, *template_header*, *diff_dir*, *proj_dir=None*, *debug=False*, *no_area=False*, *status_file=None*, *mpi=False*, *n_proc=8*)

Runs mDiff on all the pairs identified by mOverlaps.

Parameters

diffs_table : str

Table generated by mOverlaps for the images in proj_dir.

template_header : str

FITS header template for output files.

diff_dir : str

Path to output files.

proj_dir : str, optional

Specifies path to the directory containing reprojected input images.

debug : bool, optional

Turns on debugging.

no_area : bool, optional

No-area-images option. Creates difference image without requiring _area FITS images

status_file : str, optional

Output and errors are sent to status_file instead of to stdout

mpi : bool, optional

If set to True, will use the MPI-enabled versions of the Montage executable.

n_proc : int, optional

If mpi is set to True, n_proc is the number of processes to run simultaneously (default is 8)

5.1.16 mDiffFitExec

montage_wrapper.commands.**mDiffFitExec**(*diffs_table*, *fits_table*, *diff_dir*, *debug=False*, *status_file=None*)

Using the table of overlaps found by mOverlaps, mDiffFitExec runs both mDiff and mFitplane for each record. The fitting parameters are written to a file to be used by mBgModel.

Parameters

diffs_table : str

Overlap table generated by mOverlaps, the last column of which contains the filenames of the difference images generated by mDiffExec.

fits_table : str

Output table of difference paramaters.

diff_dir : str

Directory containing difference images.

debug : bool, optional

Turns on debugging

status_file : str, optional

Writes output message to status_file instead of to stdout

5.1.17 mExec

montage_wrapper.commands.**mExec**(*survey*, *band*, *raw_dir=None*, *n_tile_x=None*, *n_tile_y=None*, *level_only=False*, *keep=False*, *remove=False*, *output_image=None*, *debug_level=None*, *region_header=None*, *header=None*, *workspace_dir=None*)

The mExec module is a mosaicking executive for 2MASS, SDSS, and DSS data. It includes remote data and metadata access. Alternatively, users can mosaic a set of data already on disk.

Parameters

survey, band : str

If not mosaicking user-provided data (raw_dir option), must select one of the following combinations of survey and band: 2MASS [j, h, k] SDSS [u, g, r, i, z] DSS [DSS1, DSS1R, DSS1B, DSS2, DSS2B, DSS2R, DSS2IR]

raw_dir : str, optional

Provide path to directory containing original ("raw") data which will be reprojected and mosaicked. Not necessary if using mExec to retrieve remote data from the 2MASS, SDSS or DSS surveys.

n_tile_x : int, optional

Number of output tiles to create along the X-axis - default is 1 for a single mosaicked image.

n_tile_y : int, optional

Number of output tiles to create along the Y-axis - default is equal to n_tile_x.

level_only : bool, optional

"Level-only" option (see mBgModel)

keep : bool, optional

If retrieving data from a remote archive, the "keep" option will leave the original data products on disk after generating a mosaic. Without this option, raw data will be deleted (unless it was provided by the user with the "-r" option).

remove : bool, optional

Remove all temporary files and intermediate data products. Note: if not using the '-o' option to specify an output file, this will also remove mosaic_image.

output_image : str, optional

Provide your own filename for the output mosaic. Default filename is "mosaic_image."

debug_level : int, optional

Print out additional debugging information (levels 1-4)

region_header : str, optional

Path to header template used to create mosaic.

header : str, optional

Provide header template as text input rather than point to a file; see sample shell script that makes use of this option.

workspace_dir : str, optional

Directory where intermediate files will be created. If no workspace is given, a unique local subdirectory will be created (e.g.; ./MOSAIC_AAAaa17v)

5.1.18 mFitExec

montage_wrapper.commands.**mFitExec**(*diffs_table*, *fits_table*, *diff_dir*, *debug=False*, *status_file=None*, *mpi=False*, *n_proc=8*)

Runs mFitplane on all the difference images identified by mOverlaps and generated by mDiff or mDiffExec. mFitExec creates a table of image-to- image difference parameters.

Parameters

diffs_table : str

Overlap table generated by mOverlaps, the last column of which contains the filenames of the difference images generated by mDiffExec.

fits_table : str

Output table of difference paramaters.

diff_dir : str

Directory containing difference images.

debug : bool, optional

Turns on debugging

status_file : str, optional

Writes output message to status_file instead of to stdout

mpi : bool, optional

If set to True, will use the MPI-enabled versions of the Montage executable.

n_proc : int, optional

If mpi is set to True, n_proc is the number of processes to run simultaneously (default is 8)

5.1.19 mFitplane

montage_wrapper.commands.**mFitplane**(*in_image*, *border=None*, *debug_level=None*, *status_file=None*)

Uses least squares to fit a plane (excluding outlier pixels) to an image. It is used on the difference images generated using mDiff or mDiffExec.

Parameters

in_image : str

Input FITS file is a difference file between two other FITS files, as can be generated using mDiff.

border : int, optional

Number of border pixels to ignore at edges of image.

debug_level : int, optional

Turns on debugging to the specified level (1-3).

status_file : str, optional

Output and errors are written to status_file instead of stdout.

5.1.20 mFixNaN

montage_wrapper.commands.**mFixNaN**(*in_image*, *out_image*, *debug_level=None*, *nan_value=None*, *min_blank=None*, *max_blank=None*)

Converts NaNs found in the image to some other value (given by the user), or converts a range of supplied values into NaNs.

Parameters

in_image : str

Input FITS image file

out_image : str

Path of output FITS file. To run in "count" mode without creating an output file, use a dash ("-") for this argument.

debug_level : int, optional

Turn on debugging to the specified level (1-3)

nan_value : float, optional

Value to use in place of any NaNs

min_blank, max_blank : str, optional

If the nan_value option is not used, mFixNaN will replace all pixel values between min_blank and max_blank with NaN.

5.1.21 mFlattenExec

montage_wrapper.commands.**mFlattenExec**(*images_table*, *flat_dir*, *img_dir=None*, *debug=False*, *no_area=False*, *status_file=None*)

Runs both mFitPlane and mBackground on a set of images.

Parameters

images_table : str

Metadata table (generated by mImgtbl) describing images to be flattened.

flat_dir : str

Path to directory where output files should be created.

img_dir : str, optional

Specifies path to directory containing images to be flattened.

debug : bool, optional

Turns on debugging.

no_area : bool, optional

No-area-images option, indicating that mFlattenExec should not require area images for all the input FITS images.

status_file : str, optional

Output and errors are sent to status_file instead of to stdout

5.1.22 mGetHdr

montage_wrapper.commands.**mGetHdr**(*in_image*, *img_header*, *debug=False*, *hdu=None*, *status_file=None*)

Reads in the header from a FITS image and prints it out to a text file.

Parameters

in_image : str

Path to FITS image from which to retrieve the header.

img_header : str

Path to text file where FITS header should be written.

debug : bool, optional

Turns on debugging.

hdu : int, optional

Retrieve the header from the Fits extention given by hdu. "0" indicates the primary FITS extension, and is the default used by mGetHdr.

status_file : str, optional

Output and errors are sent to status_file instead of to stdout

5.1.23 mHdr

montage_wrapper.commands.**mHdr**(*object_or_location*, *width*, *out_file*, *system=None*, *equinox=None*, *height=None*, *pix_size=None*, *rotation=None*)

Connects to the IRSA service HdrTemplate to create a header template based on a location, size, resolution and rotation.

Parameters

object_or_location : str

Object string or coordinate location

width : float

Width (x-axis) of area

out_file : str

Path to output header template

system : str, optional

Specify a coordinate system. Can be one of: "equatorial" or "eq" (default), "ecliptic" or "ec" "galactic", "ga", "supergalactic" or "sgal"

equinox : str, optional

Specify an equinox. Default is 2000.0

height : float, optional

Height (y-axis) of area in degrees. Default is equal to width

pix_size : float, optional

Size of a pixel (in arcsec); default is 1

rotation : float, optional

Rotation of image; default is 0

5.1.24 mHdrCheck

montage_wrapper.commands.**mHdrCheck**(*in_image*, *status_file=None*)

mHdrCheck reads in the header from a FITS image (or an ASCII header template file) and checks to see if any header lines are invalid. If it finds one, it will print out a message stating which keyword is invalid and exit before checking the rest of the header. It will not report on multiple invalid values. If all value are correct, mHdrCheck will print out a "Valid FITS/WCS" message.

Parameters

in_image : str

Path of FITS file to be validated.

status_file : str, optional

Output and errors are sent to status_file instead of to stdout

5.1.25 mHdrtbl

montage_wrapper.commands.**mHdrtbl**(*directory*, *images_table*, *recursive=False*, *corners=False*, *debug=False*, *output_invalid=False*, *status_file=None*, *img_list=None*)

mHdrtbl operates in a fashion similar to mImgtbl, but is used on a set of header template files instead of FITS images.

Parameters

directory : str

Path to directory containing set of input header templates.

images_table : str

Path of output metadata table.

recursive : bool, optional

mHdrtbl can also be used as a standalone program to gather image metadata for other purposes (to populate a database, as a basis for spatial coverage searches, etc.) In this case it is often desirable to collect information on all the files in a directory tree recursively. The recursive option instructs mHdrtbl to search the given directory and all its subdirectories recursively.

corners : bool, optional

The corners option in mHdrtbl will cause eight extra columns to be added to the output metadata table containing the RA, Dec coordinates (ra1, dec1, ... ra4, dec4) of the image corners. The output is always Equatorial J2000, even if the input is some other system. This has been done to make the metadata uniform so that it can easily be used for coverage searches, etc. The corners option is not needed for normal Montage processing.

debug : bool, optional

Turn on debugging

output_invalid : bool, optional

When this option is set, mHdrtbl will explicitly output each header file it finds that does not appear to be valid, along with information on the error.

status_file : str, optional

Output and errors are written to status_file instead of being written to stdout.

img_list : str, optional

mHdrtbl will only process files with names specified in table img_list, ignoring any other files in the directory.

5.1.26 mImgtbl

montage_wrapper.commands.**mImgtbl**(*directory*, *images_table*, *recursive=False*, *corners=False*, *include_area=False*, *debug=False*, *output_invalid=False*, *status_file=None*, *fieldlist=None*, *img_list=None*)

mImgtbl extracts the FITS header geometry information from a set of files and creates an ASCII image metadata table which is used by several of the other programs. It only collects data from headers that comply with the FITS standard, but reports a count of images that fail that check.

Parameters

directory : str

Path to directory containing set of input FITS files.

images_table : str

Path of output metadata table.

recursive : bool, optional

mImgtbl can also be used as a standalone program to gather image metadata for other purposes (to populate a database, as a basis for spatial coverage searches, etc.) In this case it is often desirable to collect information on all the files in a directory tree recursively. The recursive option instructs mImgtbl to search the given directory and all its subdirectories recursively.

corners : bool, optional

The corners option in mImgtbl will cause eight extra columns to be added to the output metadata table containing the RA, Dec coordinates (ra1, dec1, ... ra4, dec4) of the image corners. The output is always Equatorial J2000, even if the input is some other system. Though not required for the core processing modules, we recommend using this option, as some of the utilities may require corner locations to function properly.

include_area : bool, optional

By default, mImgtbl ignores FITS files with names ending in _area (i.e. name_area_image), assuming them to be Montage-created area images. If you want to generate information on these images, or if you have images with _area in the title other than those generated by Montage, you should turn on this option to force mImgtbl to look at all images in the directory.

debug : bool, optional

Turn on debugging

output_invalid : bool, optional

When this option is set, mImgtbl will explicitly output each FITS file it finds that does not appear to be valid, along with information on the error.

status_file : str, optional

Output and errors are written to status_file instead of being written to stdout.

fieldlist : str, optional

Used to specify a fieldlist, which will list additional keywords to be read from the FITS headers and included in the output table. Fieldlists should specify the keyword name, type (int,char,double), and size.

img_list : str, optional

mImgtbl will only process files with names specified in table img_list, ignoring any other files in the directory.

5.1.27 mMakeHdr

montage_wrapper.commands.**mMakeHdr**(*images_table*, *template_header*, *debug_level=None*, *status_file=None*, *cdelt=None*, *north_aligned=False*, *system=None*, *equinox=None*)

From a list of images to be mosaicked together, mMakeHdr generates the FITS header that best describes the output image.

Parameters

images_table : str

Metadata table (generated by mImgtbl) describing the images to be mosaicked.

template_header : str

Path to header template to be generated.

debug_level : int, optional

Turns on debugging to the specified level (1-3).

status_file : str, optional

Output and errors are written to status_file instead of to stdout.

cdelt : float, optional

Specify a pixel scale for the header, if different from the input images

north_aligned : bool, optional

"North-aligned" option. By default, the FITS header generated represents the best fit to the images, often resulting in a slight rotation. If you want north to be straight up in your final mosaic, you should use this option.

system : str, optional

Specifies the system for the header (default is Equatorial). Possible values are: EQUJ EQUB ECLJ ECLB GAL SGAL

equinox : str, optional

If a coordinate system is specified, the equinox can also be given in the form YYYY. Default is J2000.

5.1.28 mOverlaps

montage_wrapper.commands.**mOverlaps**(*images_table*, *diffs_table*, *exact=False*, *debug_level=None*, *status_file=None*)

Analyze an image metadata table to determine a list of overlapping images. Each image is compared with every other image to determine all overlapping image pairs. A pair of images are deemed to overlap if any pixel around the perimeter of one image falls within the boundary of the other image.

Parameters

images_table : str

Table of image metadata generated by mImgtbl.

diffs_table : str

Path of output table to be generated containing overlap information.

exact : bool, optional

Enables 'exact' overlaps mode, as opposed to the default approximate algorithm. The default mode uses great-circle connecting lines between image corners to determine which images overlap. Exact mode will instead check the edge pixels of every image to determine which pixels are inside the others. Although the default mode will occasionally report some incorrect overlaps, this is not a concern since mDiff will detect and ignore these false positive results when processing the table.

debug_level : int, optional

Turns on debugging to the specified level (1 or 2)

status_file : str, optional

Output and errors are sent to status_file instead of to stdout

5.1.29 mPix2Coord

montage_wrapper.commands.**mPix2Coord**(*template_header*, *ixpix*, *jypix*, *debug=False*)

Takes an image FITS header template and a pixel (x,y) coordinate, and outputs the corresponding sky location.

Parameters

template_header : str

ASCII header template describing the image (either a FITS image, or a JPEG file created from the FITS file)

ixpix : int

X coordinate (pixel location) on image

jypix : int

Y coordinate (pixel location) on image

debug : bool, optional

Print out additional debugging information

5.1.30 mProjExec

montage_wrapper.commands.**mProjExec**(*images_table*, *template_header*, *proj_dir*, *stats_table*, *raw_dir=None*, *debug=False*, *exact=False*, *whole=False*, *border=None*, *restart_rec=None*, *status_file=None*, *scale_column=None*, *mpi=False*, *n_proc=8*)

An executive which runs mProject (or, if possible for the input/output projections, mProjectPP) for each image in an image metadata table.

Parameters

images_table : str

ASCII table (generated by mImgtbl) containing metadata for all images to be reprojected.

template_header : str

FITS header template to be used in generation of output FITS.

proj_dir : str

Directory in which to create reprojected images.

stats_table : str

Name of table for output statistics (time of each reprojection, or error messages).

raw_dir : str, optional

Specifies the path to the directory containing the images to be reprojected. If the -p option is not included, mProjExec looks for the images in the current working directory.

debug : bool, optional

Turns on debugging

exact : bool, optional

Flag indicating output image should exactly match the FITS header template, and not crop off blank pixels

whole : bool, optional

Force reprojection of whole images, even if they exceed the area of the FITS header template

border : int, optional

Ignore border width of pixels around edge of images

restart_rec : str, optional

Allows restart at record number restart_rec, if mProjExec exits upon an error

status_file : str, optional

Output and errors are written to status_file instead of being written to stdout.

scale_column : str, optional

Turn on flux rescaling (e.g. magnitude zero point correction): scale_column is the name of a column in images_table which contains scale information.

mpi : bool, optional

If set to True, will use the MPI-enabled versions of the Montage executable.

n_proc : int, optional

If mpi is set to True, n_proc is the number of processes to run simultaneously (default is 8)

5.1.31 mProject

montage_wrapper.commands.**mProject**(*in_image*, *out_image*, *template_header*, *factor=None*, *debug_level=None*, *status_file=None*, *hdu=None*, *scale=None*, *weight_file=None*, *threshold=None*, *whole=False*)

mProject reprojects a single image to the scale defined in a FITS header template file (read more about header templates here). The program produces a pair of images: the reprojected image and an "area" image consisting of the fraction input pixel sky area that went into each output pixel. The "drizzle" algorithm is implemented. The algorithm proceeds by mapping pixel corners (as adjusted by drizzle, if called) from the input pixel space to the output pixel space, calculating overlap area with each output pixel, and accumulating an appropriate fraction of the input flux into the output image pixels. In addition, the appropriate fraction of the input pixel area is accumulated into the area image pixels. Projection of points from input pixel space to output pixel space is calculated in two steps: first map from input pixel space to sky coordinates; second map from sky coordinates to output pixel space.

Parameters

in_image : str

Input FITS file to be reprojected.

out_image : str

Path of output FITS file to be created.

template_header : str

FITS header template to be used in generation of output image

factor : float, optional

Processing is done utilizing the drizzle algorithm. factor is a floating point number; recommended drizzle factors are from 0.5 to 1.

debug_level : int, optional

Causes additional debugging information to be printed to stdout. Valid levels are 1-5 (for higher debugging levels, it is recommended to redirect the output to a file).

status_file : str, optional

Output and errors are written to status_file instead of being written to stdout.

hdu : int, optional

Use the specified FITS extension (default is to use the first HDU with image data)

scale : float, optional

Apply a correction factor of scale to each pixel

weight_file : str, optional

Path to a weight map to be used when reading values from the input image.

threshold : float, optional

Pixels with weights below threshold will be treated as blank.

whole : bool, optional

Makes the output region (originally defined in the header template) big enough to include all of the input images

5.1.32 mProjectPP

montage_wrapper.commands.**mProjectPP**(*in_image*, *out_image*, *template_header*, *factor=None*, *debug_level=None*, *border=None*, *status_file=None*, *alternate_header=None*, *hdu=None*, *scale=None*, *weight_file=None*, *threshold=None*, *whole=False*)

mProjectPP reprojects a single image to the scale defined in an alternate FITS header template generated (usually) by mTANhdr. The program produces a pair of images: the reprojected image and an "area" image consisting of the fraction input pixel sky area that went into each output pixel. This area image goes through all the subsequent processing that the reprojected image does, allowing it to be properly coadded at the end.

Parameters

in_image : str

Input FITS file to be reprojected.

out_image : str

Path to output FITS file to be created.

template_header : str

FITS header template to be used in generation of output FITS

factor : float, optional

Processing is done utilizing the drizzle algorithm. factor is a floating point number; recommended drizzle factors are from 0.5 to 1.

debug_level : int, optional

Causes additional debugging information to be printed to stdout. Valid levels are 1-5; for levels greater than 1, it's recommended to redirect the output into a text file.

border : int, optional

Ignores border pixels around the image edge when performing calculations.

status_file : str, optional

Output and errors are written to status_file instead of being written to stdout.

alternate_header : str, optional

Specifies an alternate FITS header for use in mProjectPP calculations, allows substitution of psuedo-TAN headers created by mTANHdr.

hdu : int, optional

Specify the FITS extension to re-project if the FITS image is multi- extension.

scale : float, optional

Multiple the pixel values by scale when reprojecting. For instance, each 2MASS image has a different scale factor (very near 1.0) to correct for varying magnitude-zero points.

weight_file : str, optional

Path to a weight map to be used when reading values from the input image.

threshold : float, optional

If using a weight image; only use those pixels where the weight value is above threshold.

whole : bool, optional

Reproject the whole image even if part of it is outside the region of interest (don't crop while re-projecting).

5.1.33 mPutHdr

montage_wrapper.commands.**mPutHdr**(*in_image*, *out_image*, *template_header*, *debug=False*, *status_file=None*, *hdu=None*)

Replaces the header of the input file with one supplied by the user.

Parameters

in_image : str

Input FITS file.

out_image : str

Path to output FITS file (with new header)

template_header : str

ASCII header template to write into out_image.

debug : bool, optional

Turns on debugging to the specified level (this version only supports level "1").

status_file : str, optional

Output and errors are sent to status_file instead of to stdout

hdu : int, optional

Write to the specified FITS extnension (HDU).

5.1.34 mRotate

montage_wrapper.commands.**mRotate**(*in_image*, *out_image*, *debug_level=None*, *status_file=None*, *rotation_angle=None*, *ra=None*, *dec=None*, *xsize=None*, *ysize=None*)

Rotates a FITS image by an arbitrary angle. This module is meant for quick-look only; it is not flux conserving.

Parameters

in_image : str

Input FITS image.

out_image : str

Path to output (rotated) FITS image.

debug_level : int, optional

Print out additional debugging information (level can be 1-3)

status_file : str, optional

Output and errors are written to status_file instead of stdout.

rotation_angle : float, optional

Provide an angle (in degrees) to rotate the image.

ra, dec, xsize : str, optional

Center location and width (in degrees) of output image - optional. By default, entire input image area will be included in output image.

ysize : float, optional

Height (in degrees) of output image, if a new center location and width are provided. Only used if ra, dec, and xsize are specified. Defaults to xsize.

5.1.35 mShrink

montage_wrapper.commands.**mShrink**(*in_image*, *out_image*, *factor*, *fixed_size=False*, *debug_level=None*, *status_file=None*)

A utility for reducing the size of a FITS file, by averaging blocks of pixels.

Parameters

in_image : str

Input FITS file

out_image : str

Path to output FITS file.

factor : float

Size of blocks, in pixels, to average. File size will be reduced by 1/factor squared. If the fixed_size option is used, factor is the desired width of the output image.

fixed_size : bool, optional

Fixed-size option - specify output size of image, instead of the size of blocks of pixels to be averaged

debug_level : int, optional

Turns on debugging to the specified level (1-4).

status_file : str, optional

Output and errors are sent to status_file instead of to stdout

5.1.36 mSubimage

montage_wrapper.commands.**mSubimage**(*in_image*, *out_image*, *ra*, *dec*, *xsize*, *debug=False*, *all_pixels=False*, *hdu=None*, *status_file=None*, *ysize=None*)

Creates a subimage (or "cutout") of a FITS file. To use mSubimage in 'pixel' mode, see mSubimage_pix

Parameters

in_image : str

Input FITS file.

out_image : str

Path to output FITS file.

ra : float

RA of center of output image.

dec : float

Declination of center of output image.

xsize : float

Width of output image in degrees.

debug : bool, optional

Turns on debugging.

all_pixels : bool, optional

All pixels - Force retrieval of whole image (useful to extract an entire HDU)

hdu : int, optional

Operate on the specified FITS header extension (HDU)

status_file : str, optional

Output and errors are sent to status_file instead of to stdout

ysize : float, optional

Height of output image in degrees (default is equal to xsize.

5.1.37 mSubimage_pix

montage_wrapper.commands.**mSubimage_pix**(*in_image*, *out_image*, *xstartpix*, *ystartpix*, *xpixsize*, *debug=False*, *hdu=None*, *status_file=None*, *ypixsize=None*)

Creates a subimage (or "cutout") of a FITS file ('pixel' mode)

Parameters

in_image : str

Input FITS file.

out_image : str

Path to output FITS file.

xstartpix : int

Pixel along the x-axis where the cutout image will begin

ystartpix : int

Pixel along the y-axis where the cutout image will begin

xpixsize : int

Width of output image in pixels

debug : bool, optional

Turns on debugging.

hdu : int, optional

Operate on the specified FITS header extension (HDU)

status_file : str, optional

Output and errors are sent to status_file instead of to stdout

ypixsize : int, optional

Height of output image in pixels (default is equal to xpix_size

5.1.38 mSubset

montage_wrapper.commands.**mSubset**(*images_table*, *template_header*, *subset_table*, *debug_level=None*, *fast_mode=False*, *status_file=None*)

Generates a table of images that is a subset of the input table, containing only those images that cover the area defined by a given FITS header.

Parameters

images_table : str

ASCII table (generated by mImgtbl) containing metadata for image collection.

template_header : str

FITS header template defining the area of interest.

subset_table : str

Path to output table, which will contain only those FITS images covering the area defined by template_header.

debug_level : int, optional

Turns on debugging to the specified level (1-3).

fast_mode : bool, optional

Fast mode - input file must include corners (corners option in mImgtbl) to utilize this mode.

status_file : str, optional

Output and errors are sent to status_file instead of to stdout

5.1.39 mTANHdr

montage_wrapper.commands.**mTANHdr**(*orig_header*, *new_header*, *debug=False*, *order=None*, *max_iter=None*, *tolerance=None*, *status_file=None*)

Analyzes a template file and determines if there would be an adequate equivalent distorted TAN projection, within a specified tolerance, and outputs the alternate header. This header can be used in conjunction with mProjectPP to produce a TAN plane image. This process is considerably faster than projecting with the general purpose tool mProject.

Parameters

orig_header : str

Input FITS header

new_header : str

Path to output header to be created

debug : bool, optional

Print additional debugging information to stdout.

order : str, optional

Order of output header polynomial focal plane distortions (default = 4)

max_iter : int, optional

Maximum number of iteration attempts to produce header (default = 50)

tolerance : float, optional

Distortion tolerance value for acceptable output (default = 0.01)

status_file : str, optional

Output and errors are written to status_file instead of stdout.

5.1.40 mTblSort

montage_wrapper.commands.**mTblSort**(*in_table*, *column_name*, *out_table*, *debug=False*)

Sorts a table on numeric values.

Parameters

in_table : str

Path to input table

column_name : str

Name of column to sort on (column must contain numeric values)

out_table : str

Path to output table

debug : bool, optional

Turns on debugging

5.1.41 mTileHdr

montage_wrapper.commands.**mTileHdr**(*orig_header*, *new_header*, *n_x*, *n_y*, *ix*, *iy*, *debug=False*, *status_file=None*, *xpad=None*, *ypad=None*)

Takes a header template file and creates another which represents one of a regular set of tiles covering the original. The user specifies the tile gridding and which tile is desired.

Parameters

orig_header : str

ASCII header template from which to derive tiled headers

new_header : str

Path to output header

n_x : int

Number of tiles in the x-direction

n_y : int

Number of tiles in the y-direction

ix : int

Integer identifying the x location of the output tile on the grid (counting from 0)

iy : int

Integer identifying the y location of the output tile on the grid (counting from 0)

debug : bool, optional

Turns on debugging.

status_file : str, optional

Output and errors are sent to status_file instead of to stdout

xpad : int, optional

Number of pixels to overlap tiles in the x direction (default is 0)

ypad : int, optional

Number of pixels to overlap tiles in the y direction (default is 0). Only used if xpad is present.

5.1.42 mTileImage

montage_wrapper.commands.**mTileImage**(*in_image*, *tiles_x*, *tiles_y*, *overlap_x=None*, *overlap_y=None*)

mTileImage splits up an image into a given number of tiles. An overlap between each tile can optionally be specified.

Parameters

in_image : str

Input FITS file

tiles_x : int

Number of tiles along x axes.

tiles_y : int

Number of tiles along y axes.

overlap_x : int, optional

Pixel overlap in x direction.

overlap_y : int, optional

Pixel overlap in y direction.

CHAPTER 6

montage_wrapper.status Module

6.1 Functions

parse_struct(command, string)
simplify(value)

6.1.1 parse_struct

montage_wrapper.status.**parse_struct**(*command*, *string*)

6.1.2 simplify

montage_wrapper.status.**simplify**(*value*)

6.2 Classes

MontageError
Struct(command, string)

6.2.1 MontageError

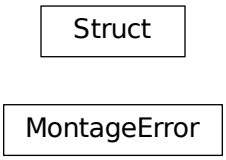
exception montage_wrapper.status.**MontageError**

6.2.2 Struct

class montage_wrapper.status.**Struct**(*command*, *string*)

Bases: object

6.3 Class Inheritance Diagram



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