

AH_{ELP} for CIAO 3.4

dmregrid

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Synopsis

Rebin a stack of 2-dimensional images.

Syntax

```
dmregrid infile outfile bin rotangle rotxcenter rotycenter xoffset
yoffset npts [coord_sys] [clobber] [verbose]
```

Description

This tool regrids each input image within the input dataset based on the binning specification, offsets, minimum and maximum channels, rotation angle, and center of rotation. For a stack of input files, the output file is the sum of the regridded images. The rotation and offset parameters may be specified as a stack in order to apply different values to each of the input file. However, the same binning is applied to all input files; it cannot be given as a stack. Physical and world coordinate systems (containing the transformation given by the first regridding specification) are attached to the output image axes.

If the parameter `npts=0`, the exact algorithm is used in which for each unit pixel overlapping a regridded pixel, a polygon is created that is the intersection of the two pixels. The area of this polygon is calculated and used to weight the number of counts within the unit pixel to be allocated to the regridded pixel.

If `npts` is given a positive value, the approximate regridding algorithm is used in which `npts*npts` uniformly spaced points within a regridded pixel are sampled; the appropriate fraction of the number of counts within the unit pixel encompassing each sampling point is then allocated to the regridded pixel.

The approximate algorithm is faster than the exact algorithm by a factor dependent on the value of `npts`, the binning scales, and the fraction of the input which is non-zero. For example, for `npts=10` and the binning scales=1, the approximate algorithm is about 10 to 50 times faster. For larger binning scales, the factor is greater due to fewer points being sampled.

Example 1

```
dmregrid image.fits newimage.fits "20:50:1,30:60:1" rotangle=0
rotxcenter=0 rotycenter=0 xoffset=0 yoffset=0 npts=0 clobber=yes
verbose=0
```

Regrid a single image by binning a subset of the image with unit bin factors, no rotation and no offsets, clobbering the previous output file, using the exact algorithm, minimum verbosity.

Example 2

```
dmregrid image.fits newimage.fits "20:100:5,30:110:10" rotangle=10
rotxcenter=25 rotycenter=40 xoffset=15 yoffset=20 npts=10 verbose=5
```

Regrid an image by binning a subset of the image with bin factors of 5 and 10, rotating about (25,40) by 10 degrees, with an offset of (15,20), clobbering the previous output file, maximum verbosity. The approximate algorithm is used, with 100 points within each regridded pixel sampled.

Example 3

```
dmregrid @inlist.txt newimage.fits "1:100:1,1:300:3" rotangle=@rotlist
rotxcenter=@xrotlist rotycenter=@yrotlist xoffset=@xofflist
yoffset=@yofflist npts=0
```

Regrid the images im1.fits and im2.fits listed in the ASCII file inlist.txt by binning from 1:100:1 in x and 1:300:3 in y, rotation angles listed in the file rotlist, offsets listed in the files xofflist and yofflist, rotation center coordinates listed in the files xrotlist and yrotlist, and clobbering the previous output file, summing the images to be output using the exact algorithm.

Example 4

```
dmregrid @inlist.txt newimage.fits "1:100:1,1:300:3" rotangle=25
rotxcenter=30 rotycenter=40 xoffset=@xofflist yoffset=@yofflist npts=0
```

Identical to example 3, except perform both rotations about (30,40) by 25 degrees.

Parameters

name	type	ftype	def	min	max	units	reqd	stacks
<u>infile</u>	file	input					yes	yes
<u>outfile</u>	file	output					yes	
<u>bin</u>	string						yes	no
<u>rotangle</u>	string		0			degrees	yes	yes
<u>rotxcenter</u>	string		0				yes	yes
<u>rotycenter</u>	string		0				yes	yes
<u>xoffset</u>	string		0				yes	yes
<u>yoffset</u>	string		0				yes	yes
<u>npts</u>	integer		0	0	999		yes	
<u>coord_sys</u>	string		logical					
<u>clobber</u>	boolean		no					
<u>verbose</u>	integer		0	0	5			

Detailed Parameter Descriptions

Parameter=infile (file required filetype=input stacks=yes)

The input dataset or stack.

Input images to rebin. If more than 1 image is input, the output will be the sum (co-added) of the rebinned input images.

Parameter=outfile (file required filetype=output)

The output file name.

Parameter=bin (string required stacks=no)

The binning specification.

The binning specification which consists of the minimum channel number for x, the maximum channel number for x, the bin factor for x, and the analogous parameters for y. The same binning is used for all input files. The binning may be given in either image or physical coordinates; the coordinate system of the bin parameter is defined by the `coords_sys` parameter.

Parameter=rotangle (string required default=0 units=degrees stacks=yes)

The CCW rotation angle in degrees of the regridded image in degrees about the rotation center (the location about which the regridded image is to be rotated).

Parameter=rotxcenter (string required default=0 stacks=yes)

The x-coordinate of the rotation center.

Parameter=rotycenter (string required default=0 stacks=yes)

The y-coordinate of the rotation center.

Parameter=xoffset (string required default=0 stacks=yes)

The x-offset of the regridded image.

Parameter=yoffset (string required default=0 stacks=yes)

The y-offset of the regridded image.

Parameter=npts (integer required default=0 min=0 max=999)

If positive, the number of points sampled along a subgrid in each regridded pixel calculated using the approximate algorithm. If 0, the exact algorithm is used.

Parameter=coord_sys (string default=logical)

Controls whether the 'bin' parameter is interpreted as 'logical' or 'physical' pixels.

Parameter=clobber (boolean default=no)

Specifies if an existing output file should be overwritten.

Parameter=verbose (integer default=0 min=0 max=5)

Specifies the level of verbosity in displaying diagnostic messages (0–5).

CHANGES IN CIAO 3.2

Specify Coordinate System for Binning

It is possible to specify the 'bin' grid in either image or physical coordinates. A new parameter (coords_sys) controls whether 'bin' is interpreted as logical (the default, old behavior) or physical. Images covering different physical pixel ranges and at different resolutions (binning) can now be combined without applying offsets.

CHANGES IN CIAO 3.0

Fixed limitation that multiple offsets, angles, or rotation centers required specification in external ("@") files.

Fixed memory leak for large file(s) in stack.

Fixed failure to propagate units from (first) file.

Bugs

See the [bugs page for this tool](#) on the CIAO website for an up-to-date listing of known bugs.

See Also

calibration

[ardlib](#)

dm

[dmbinning](#), [dmimages](#), [dmimfiltering](#)

tools

[acis_bkgrnd_lookup](#), [acis_fef_lookup](#), [acis_set_ardlib](#), [acissspec](#), [aconvolve](#), [acrosscorr](#),
[add_grating_orders](#), [add_grating_spectra](#), [arestore](#), [asphist](#), [dither_region](#), [dmappend](#), [dmarfadd](#),
[dmcontour](#), [dmcoords](#), [dmcoppy](#), [dmextract](#), [dmfilth](#), [dmgroup](#), [dmimg2jpg](#), [dmimgcalc](#), [dmimghist](#),
[dmimgpick](#), [dmimgthresh](#), [fullgarf](#), [get_sky_limits](#), [mkacisrmf](#), [mkarf](#), [mkexpmap](#), [mkgarf](#), [mkgrmf](#),
[mkinstmap](#), [mkpsf](#), [mkrmf](#), [mkwarf](#), [psextract](#), [psf_project_ray](#), [rmfimg](#), [specextract](#), [tgextract](#)