imrebin

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Abstract

This task rebins the input image to a different pixel size.

1 Instruments/Modes

The task is not XMM-specific.

2 Description

The task writes an output image in which the pixels of the input image are grouped together. Thus, each pixel of the output image has dimensions which are some integer product of the dimensions of the input pixels. The ratio of output-to-input dimension may be different for the x and y image axes.

2.1 Pixel dimensions

The ratio of output-to-input pixel dimensions are specified by the parameters `binxsize` and `binysize`; in addition, the starting row or column can be defined using parameters `offsetx` and `offsety`. At present, only integer values are allowed for these four parameters.

The working of these is perhaps best shown by some examples. I'll restrict myself to the x axis for the sake of simplicity; the working in the y dimension is of course identical in character.

All pixel indices are taken to start at 1 not 0.

- Example 1: input is 44 pixels wide, `binxsize`=1, `offsetx`=0 (the default). In this case, as one might expect, the output image contains the same number of columns as the input.
- Example 2: input is 51 pixels wide, `binxsize`=2, `offsetx`=0 (the default). In this case the output image is 26 pixels wide. The first column of the output image contains columns 1 and 2 of the input image, the second contains 3 and 4, and so forth. The last (26th) column of the output contains just column 51 of the input.
- Example 3: input is 28 pixels wide, `binxsize`=5 (the present default), `offsetx`=3. 28 divided by 5, rounded to the next highest integer, equals 6. The `offsetx` value shifts the

input image to the right so that the first output column contains not columns 1 to 5 of the input but only columns 1 and 2; columns 3 to 7 of the input go into column 2 of the output, columns 8 to 12 go into 3, and so forth. However now we see that 6 output columns are not sufficient, because column 6 of the output contains only columns 23 to 27 on the input, leaving the last input column unallocated. Hence the output in this case is broadened to 7 columns, the last containing just column 28 of the input.

As you can see, the dimensions of the output are adjusted in every case to be just large enough that no input columns (or rows) are omitted.

Offset values greater than or equal to the number of input pixel dimensions in the output pixels are not useful since in all cases the output with `offsetx`=N for example is the same as for `offsetx`=N modulo `binxsize`.

As seen in the second and third examples above, in cases in which there is not a perfect alignment between the old and new image boundaries, some 'dummy' input pixels can become included in output pixels at the edges of the image: in example 3 for example there are 3 dummy input columns in the first output column and 4 in the last output column. These dummy pixels are not included when the output values are calculated (see section 2.2).

2.2 Relation between input and output values

Three options are available:

1. `newvaluestyle`='sum': the values of the corresponding input pixels are simply added.
2. `newvaluestyle`='average': the values of the corresponding input pixels are averaged.
3. `newvaluestyle`='rms': the output value is calculated as the root mean square of the coore-sponding input pixels.

3 Parameters

This section documents the parameters recognized by this task (if any).

Parameter	Mand	Type	Default	Constraints
inset	yes	dataset	dummy_default	

The input image dataset.

outset	no	dataset	rebinned_image.ds	

The output (rebinned) image dataset.

newvaluestyle	no	string	sum	sum—average—rms

This specifies the way in which the values of the output image are calculated. See section 2.2.

binxsize	no	integer	5	1 ≤`binxsize`

The number of columns of the input image to fit into 1 column of the output image.

binysize	no	integer	5	1 ≤`binysize`

The number of rows of the input image to fit into 1 row of the output image.

offsetx	no	integer	0	0 ≤`offsetx`

The number i of the first column of the input image to go into the first column of the output image is given by $i = 1$+`offsetx`.

offsety	no	integer	0	0 ≤`offsety`

The number j of the first row of the input image to go into the first row of the output image is given by $j = 1$+`offsety`.

4 Errors

This section documents warnings and errors generated by this task (if any). Note that warnings and errors can also be generated in the SAS infrastructure libraries, in which case they would not be documented here. Refer to the index of all errors and warnings available in the HTML version of the SAS documentation.

badNewValueStyle *(error)*
The value of the `newvaluestyle` parameter was not recognized.

offsetXTooBig *(warning)*
The task is designed not to allow either wholly blank ('dummy') columns or rows in the output, or omission of any columns or rows of the input. This makes it is pointless to specify values of `offsetx` larger than or even equal to `binxsize`. If the user specifies such values, then no harm is done; however this warning is issued because such an event implies that the user thought that doing so *would* have some effect: in this case their expectation, whatever it was, will not be met.
corrective action: The `offsetx` is recalculated modulo `binxsize`.

offsetYTooBig *(warning)*
The task is designed not to allow either wholly blank ('dummy') columns or rows in the

output, or omission of any columns or rows of the input. This makes it is pointless to specify values of `offsety` larger than or even equal to `binysize`. If the user specifies such values, then no harm is done; however this warning is issued because such an event implies that the user thought that doing so *would* have some effect: in this case their expectation, whatever it was, will not be met.
corrective action: The `offsety` is recalculated modulo `binysize`.

5 Input Files

1. A FITS dataset containing a 2-dimensional image array in the primary extension. The datatype of the image may be 8-bit integer, 16-bit integer, 32-bit integer, 32-bit real or 64-bit real.

6 Output Files

1. A FITS dataset containing a 2-dimensional image array in the primary extension, in general NOT the same size as the input array, but containing all of the keywords (except those pertaining to DSS) of the input. Note that, where WCS keywords are found in the input image, these are adjusted correctly to correspond to the new binning scheme.

   The task attempts to make the datatype of the output image the same as that of the input; however situations can arise in which this is not possible; in this case the earliest member of the sequence (int8, int16, int32, real32, real64) is chosen which can best describe the maximum value of the output.

7 Algorithm

References