adapt

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Abstract

This task creates adaptively smoothed background subtracted and exposure corrected images.

1   Instruments/Modes

Instrument	Mode
EPIC	Imaging

2   Use

pipeline processing	no
interactive analysis	yes

3   Description

adapt creates adaptively smoothed background subtracted and exposure corrected images. For each unmasked pixel, the program will average neighboring pixels within a circle of increasing radius until a selected number of counts is reached. The original pixel is then given the average surface brightness for the pixels within the circle. Binning by pixels can be selected.

Warning and requirements: *adapt* is part of the *esas* package integrated into SAS, but is limited to work within *esas* data reduction scheme. This is particularly true with respect to the structure and names of the input files. In particular, *adapt* assumes that other tasks from the package, like *mos-spectra*, *mos-back*, and if desired *comb* must have been successfully run for the exposures to be used.

4   Parameters

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

Parameter	Mand	Type	Default	Constraints

smoothingcounts	yes	int	50	

The number of counts to accumulate for the smoothing

thresholdmasking	yes	real	0.02	

The scale factor for excluding regions from the smoothing based on a mask image. In the default mode the average exposure is calculated and then any pixel with exposure less than fraction*average value is excluded.

detector	yes	int	0	0—1

Detector, `1` for a specific instrument and exposure, `0` for the combined image (i.e., the output of `comb`).

elow	yes	int	400	

The low energy for the band in eV

ehigh	yes	int	1250	

The high energy for the band in eV

binning	yes	int	1	

Binning control with `1` for no binning, and integers greater than 1 for binning that number of pixels in each dimension.

withpartcontrol	yes	bool	yes	

Particle background control, "yes" to subtract the model particle background image.

withsoftcontrol	yes	bool	no	

Soft proton background control, "yes" to subtract the soft proton background image.

withswcxcontrol	yes	bool	no	

Solar wind charge exchange background control, "yes" to subtract the SWCX background image.

withmaskcontrol	yes	bool	no	

Control for including an additional masking image.

maskfile	yes	dataset		

The file name for an image to provide additional masking if desired. If left blank then there will be no additional masking. The mask images must be the same size and projection as the other images.

prefix	yes	string	1S001	

Prefix defining the exposure used, with the `esas` nomenclature, eg. S003 means PN S003 exposure, while 1S002 and 2S003 mean MOS1 S002 and MOS2 S003 exposures, respectively.

clobber	no	boolean	yes	T/F

Clobber existing files?

5 Input Files

The exposure images, products from running `mos_spectra`, `mos-back`, or `pn_spectra`, `pn-back`, and, eventually `comb`, following the particular nomenclature used in the esas package, eg.: `mos1S002-obj-im-350-800.fits` for a MOS1 image in that spectral range, or `comb-obj-im-350-800.fits` if the output from `comb` is to be used.

6   Output Files

- `adapt-`*elow*`-`*ehigh*`.fits` – The smoothed image for the selected energy band (*elow* and *ehigh*) of the selected region in sky coordinates.

- `size-`*elow*`-`*ehigh*`.fits` – The smoothing scale factor image for the selected energy band (*elow* and *ehigh*) of the selected region in sky coordinates. The smoothing uses a conical scaling of the count values and the scale factor is the FWHM.

- `size-`*elow*`-`*ehigh*`.qdp` – A QDP plot file of the smoothing scale factor histogram of the data for the selected energy band (*elow* and *ehigh*) of the selected region.

- `radial-filt-`*elow*`-`*ehigh*`.qdp` – A QDP plot file of the radial profile of the data for the selected energy band (*elow* and *ehigh*) of the selected region.

7   Algorithm

`adapt` adaptively smooths background subtracted and exposure corrected images. For each unmasked pixel, the program will average neighboring pixels within a circle of increasing radius until a selected number of counts is reached. The original pixel is then given the average surface brightness for the pixels within the circle. Pixel binning can also be selected.

8   Comments

References