
Subject: Adding/Subtracting/Multiplying images together

Posted by [Barbara](#) on Tue, 21 Jul 2009 20:37:21 GMT

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I am extremely new to IDL, and am working with an astronomy professor looks at fits files. I have been able to split the header and image apart, however now I must be able to add images, then multiply them, and find the average image. Does anyone know how to do this?

Subject: Re: Adding/Subtracting/Multiplying images together

Posted by [soniya.iiser](#) on Wed, 09 Mar 2016 02:27:28 GMT

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On Wednesday, 22 July 2009 06:37:21 UTC+10, Barbara wrote:

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> looks at fits files. I have been able to split the header and image
> apart, however now I must be able to add images, then multiply them,
> and find the average image. Does anyone know how to do this?

As a follow up to this question how to add if the wcs of the images dont match ? Then I guess $image_added = image_1 + image_2$ this wouldn't work.. Is that right?

Subject: Re: Adding/Subtracting/Multiplying images together

Posted by [wlandsman](#) on Wed, 09 Mar 2016 14:03:12 GMT

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On Tuesday, March 8, 2016 at 9:27:33 PM UTC-5, soniya...@gmail.com wrote:

> As a follow up to this question how to add if the wcs of the images dont match ? Then I guess
> $image_added = image_1 + image_2$ this wouldn't work.. Is that right?

One thing to try is the procedure `hastrom.pro`
<http://idlastro.gsfc.nasa.gov/ftp/pro/astrom/hastrom.pro>

Given the image array and FITS header of the first image, and the FITS header of the second image, this procedure will warp the first image until its astrometry matches that of the second image. You can then directly add the images together.

--Wayne

Subject: Re: Adding/Subtracting/Multiplying images together

Posted by [Russell\[1\]](#) on Wed, 09 Mar 2016 14:04:51 GMT

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Soniya...

This is a very tough question to answer, because it depends critically on the properties of the images to add and the (desired) property of the result. In broad-brush terms, you will need to interpolate one image to the WCS of the other, before proceeding. If you are familiar with the IDL `astrolib`, then you can use `hastrom`, but that will only bi-linearly interpolate --- and you might actually want/need something fancier (such as sinc-interpolation). That issue notwithstanding, the notion of "adding" is not actually that clear when you have a pixelated image, look up the process of drizzling:

<http://drizzlepac.stsci.edu>

of course that is relevant to HST only, but the mathematical underpinning is generic to any telescope/camera. You might also look at SWarp:

<http://www.astromatic.net/software/swarp>

which does very similar things.

However, be very (no VERRRRRRYYYY) cautious with this. Any interpolation you do (bilinear, sinc, drizzle, etc.) will by its VERY nature, introduce pixel correlation to your image. If you're a grad student, you've probably heard senior faculty or postdocs complain about "correlated errors"? Well, this is the worst manifestation of that problem. So, you need to be very careful in interpreting the results and understanding properties of your resultant image.

Good luck,
Russell

PS. I tried to make this sound very grave, because it is actually a tough problem. However it's so bad, many people have developed many ways of cracking this nut. I've just pointed you to the two most common approaches.

On Wednesday, March 9, 2016 at 3:27:33 AM UTC+1, soniya...@gmail.com wrote:

> On Wednesday, 22 July 2009 06:37:21 UTC+10, Barbara wrote:

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Subject: Re: Adding/Subtracting/Multiplying images together

Posted by [wlandsman](#) on Wed, 09 Mar 2016 15:04:22 GMT

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On Wednesday, March 9, 2016 at 9:04:54 AM UTC-5, rrya...@gmail.com wrote:

> Soniya...

>

> This is a very tough question to answer, because it depends critically on the properties of the images to add and the (desired) property of the result.

I agree with this and only add a couple of comments. First, hastrom.pro uses the IDL internal function POLY_2D(), and so allows both bilinear and cubic interpolation. I find that setting CUBIC=-0.5 works well for high signal to noise data.

Among the reasons for co-adding images are to create a prettier picture, to improve photometry, and to identify weak features not visible on a single image. For a prettier (higher S/N) picture, the particular interpolation method is not very important. For precision photometry of a bright source, it is often better to perform the photometry on individual images and then statistically coadd the photometry results. (I was involved recently in a project like this where drizzle interpolation gave surprisingly poor results.) In other cases, yes it is something of an art to determine the best interpolation method (and not all methods are easily available in IDL).
