Subject: CCD saturation
Posted by Wox on Fri, 24 Oct 2008 09:54:44 GMT
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Hi all,

Does anyone have any experience in correcting images for saturation streaking? See image b in
http://learn.hamamatsu.com/articles/images/bloomingfigure1.j pg

I tried to do something with IDL's sobel+contour but it seems hard to preserve the spots without streaking while removing the saturated ones along with its stripes. Any ideas?

Thanks,

Wout

Subject: Re: CCD saturation
Posted by MichaelT on Mon, 27 Oct 2008 13:43:44 GMT
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A couple of years ago I did something like this to remove the streaks (can't find the program any more, though...):

First label all stars in your image (img) which have pixel values above a threshold value

```
lab = Label_Region(img gt threshold)
h = (histogram(lab))[1: *]    ;[1: *] removes background pixel count

dims = Size(img, /Dimensions)  ;image dimensions
```

So h now contains the pixel count for each identified area. Saturated stars with streaks usually have a pixel count above a certain value (their area is larger). In a loop I then checked which area is larger than other_threshold and then determined the aspect ratio of each of these areas:

```
;Areas larger than 100 pixels probably have streaks (or whatever
threshold is best in your case)
other_threshold = 100

w = Where(h gt other_threshold, n_areas)

;limiting aspect ratio, example: 1.2 (or whatever you like) considered
```

```
to be a streaked star
a_threshold = 1.2

For i = 1, n_areas - 1 Do Begin

  wa = Where(lab EQ w[i] + 1)    ;+1 to compensate for the removed
background count

  wx = wa Mod Dim[0]   ;Find the x- and y-locations of the pixels
  wy = wa / Mod[0]

  ;If your streaks are vertical, otherwise reverse wx and wy
  aspect_ratio = (Max(wy) - Min(wy) + 1.0) / (Max(wx) - Min(wx) + 1.0)

  If aspect_ration GT a_threshold Then Begin
    ;Do something to remove the streaks
  EndIf

EndFor
```

I can't remember exactly how I removed the streaks. I think I substituted the streak's pixels by pixel values that were found just adjacent to the streak (left and right). I also added some random noise to the pixels to make them less obvious.

I hope it helps.

Michael

Subject: Re: CCD saturation
Posted by Wout De Nolf on Tue, 28 Oct 2008 08:56:42 GMT
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On Mon, 27 Oct 2008 06:27:03 -0700 (PDT), pgrigis@gmail.com wrote:

>
>
> Wox wrote:
>> Marshall Perrin wrote:
>>
>>> Shape detection is not the way to go here, versus detecting the level
>>> at which pixels saturate. There should be some characteristic number of
>>> counts per pixel below which you know data is not saturated.
>>
>> Yes, but this only works for the inner part of a saturated spot +
>> streaks. The edges don't have a value of 65535 (it's a 16bit CCD
>> camera) and can in fact have a lower value than non-saturated spots

>> which I want to preserve.
>
> Does the CCD really behaves this way? Seems pretty bad if
> saturation is spread around that way... Are you sure it is not stray
> light?

I'm sure. And yes it's bad and should be avoided (by lowering acquisition time, putting absorbers in the beam, etc.), but in automated measurements it can happen you only notice it after the experiment.

Subject: Re: CCD saturation
Posted by Wout De Nolf on Tue, 28 Oct 2008 09:42:46 GMT
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Thanks guys. Michael's code does the trick. I will also check Jï¿½rï¿½me's suggestion to preserve the spot center.

Subject: Re: CCD saturation
Posted by MichaelT on Wed, 29 Oct 2008 15:07:54 GMT
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I just noticed two typos in my example code that you will likely already have discovered:

For i = 1, n_areas - 1 Do Begin
Change this to
For i = 0, n_areas - 1 Do Begin

Mod[0] certainly should be Dim[0]

Michael

Subject: Re: CCD saturation
Posted by Wout De Nolf on Thu, 30 Oct 2008 08:31:26 GMT
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On Wed, 29 Oct 2008 08:07:54 -0700 (PDT), MichaelT
<michael.theusner@googlemail.com> wrote:

> I just noticed two typos in my example code that you will likely
> already have discovered:
>
> For i = 1, n_areas - 1 Do Begin

> Change this to
> For i = 0, n_areas - 1 Do Begin
>
> Mod[0] certainly should be Dim[0]
>
> Michael

I noticed already, but thanks for your concern :-).
