Subject: partial differential equation
Posted by Ali Gamal on Tue, 13 Dec 2016 08:49:41 GMT
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Hi,

If
lm=[623.2,624.5,665.3,778.2]
S=ss[0:300,0:400,0:18,0] ;;; an image
compute

How can I do it using IDL?

Subject: Re: partial differential equation
Posted by Craig Markwardt on Tue, 13 Dec 2016 15:24:25 GMT
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On Tuesday, December 13, 2016 at 3:49:42 AM UTC-5, AGW wrote:
> Hi,
>
> If
> lm=[623.2,624.5,665.3,778.2]
> S=ss[0:300,0:400,0:18,0] ;;; an image
> compute
>

>
> How can I do it using IDL?

So S has 19 slices but lm only has 4 elements? How is that supposed to work? You can check out Wikipedia's article on finite differences.

Subject: Re: partial differential equation
Posted by Ali Gamal on Tue, 13 Dec 2016 17:18:22 GMT
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On Tuesday, December 13, 2016 at 10:49:42 AM UTC+2, AGW wrote:
> Hi,
>
> If
> lm=[623.2,624.5,665.3,778.2]
> S=ss[0:300,0:400,0:18,0] ;;; an image
> compute

>

>
> How can I do it using IDL?

lm have 19 value, but I did not write all values, suppose
lm=[1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18]

else

Subject: Re: partial differential equation
Posted by Craig Markwardt on Tue, 13 Dec 2016 17:35:09 GMT
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On Tuesday, December 13, 2016 at 12:18:32 PM UTC-5, AGW wrote:
> On Tuesday, December 13, 2016 at 10:49:42 AM UTC+2, AGW wrote:
>> Hi,
>>
>> If
>> lm=[623.2,624.5,665.3,778.2]
>> S=ss[0:300,0:400,0:18,0]   ;;; an image
>> compute
>>

>>
>> How can I do it using IDL?
>
> lm have 19 value, but I did not write all values, suppose
> lm=[1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18]
>
> else

Well, it's easy and it's hard. If you read the Wikipedia article about finite differences, it's easy. The expression for finite differences is,

That's easy to express in IDL,

```
  d2s_dlm2 = s*0  ;; Initialize to blank array
  for i = 1, 17 do begin
    h2 = (lm[i]-lm[i-1])*(lm[i+1]-lm[i])  ;; compute h^2 term
    d2s_dlm2[*,*,i] = (s[*,*,i+1]-2*s[*,*,i]+s[i-1]) / h2
  endfor
```

Note that it's not possible to compute the finite difference second derivative at the first and last LM position because there's not enough data to estimate it.

Now you want to sum it. That's easy too,
  x = total(d2s_dlm2,3)

But the problem is that the sum of a second derivative is more or less equivalent to the integral of a second derivative, i.e. just a single derivative. It's really equivalent to computing the mean slope of S. You don't have to do any of the second derivative stuff to do this. You should basically get the same answer by doing,
  x = (s(*,*,18) - s(*,*,0))/(lm(18)-lm(0))
This is not quite true if LM is unevenly spaced.

So you really have to decide if this is what you want.

Did you mean to take an absolute value? Or square the second derivative before summing it?

CM

Subject: Re: partial differential equation
Posted by Ali Gamal on Tue, 13 Dec 2016 17:50:39 GMT
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On Tuesday, December 13, 2016 at 10:49:42 AM UTC+2, AGW wrote:
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>
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Thanks

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