Subject: Re: Force Field

Posted by David Fanning on Tue, 13 Sep 2005 18:22:41 GMT

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## Andres writes:

- > I have a potential field on a grid (it has periodic boundary
- > conditions), and I want to calculate the acceleration (force field) of
- > this, i.e., f=-grad(potential), I need the gradient of the potential .
- > I wrote a procedure, but it has to many for loops in it. Does any body
- > know a fast and smart way to do this?

Here is a function I use to calculate the gradient of a 2D image:

```
FUNCTION Gradient, image
 ; gradient \sim = |Gx| + |Gy|
 COMPILE OPT idl2
 ; Check parameters.
 ON ERROR, 2
 IF N_Elements(image) EQ 0 THEN Message, 'Must pass 2D image data.'
 ; Calculate gradient Gx.
 xkernel = [ [-1.0, 0.0, 1.0], [-2.0, 0.0, 2.0], [-1.0, 0.0, 1.0] ]
 gx = Convol( Float(image), xkernel, Center=1, /Edge_Wrap )
 ; Calculate gradient Gy.
 ykernel = [[-1.0, -2.0, -1.0], [0.0, 0.0, 0.0], [1.0, 2.0, 1.0]]
 gy = Convol( Float(image), ykernel, Center=1, /Edge_Wrap )
 RETURN, ABS(gx) + ABS(gy)
END
I use it like this:
 IDL> TVSCL, Gradient(image2d)
Cheers,
David
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
```

Coyote's Guide to IDL Programming: http://www.dfanning.com/

Subject: Re: Force Field

Posted by Kenneth P. Bowman on Wed, 14 Sep 2005 02:13:28 GMT

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In article <1126634205.227520.96190@f14g2000cwb.googlegroups.com>, "Andres" <panblosky@gmail.com> wrote:

- > Hi all,
- >
- > I have a potential field on a grid (it has periodic boundary
- > conditions), and I want to calculate the acceleration (force field) of
- > this, i.e., f=-grad(potential), I need the gradient of the potential .
- > I wrote a procedure, but it has to many for loops in it. Does any body
- > know a fast and smart way to do this?
- > Thanks!!

>

> Andres

Assuming that you are happy with first-order, centered differences, you want something like this

```
grad_x = (SHIFT(phi, -1, 0) - SHIFT(phi, 1, 0))/(2.0*dx)

grad_y = (SHIFT(phi, 0, -1) - SHIFT(phi, 0, 1))/(2.0*dy)
```

where phi is the potential It think this handles the periodic boundary conditions properly, but check to make sure.

Cheers, Ken Bowman

Subject: Re: Force Field

Posted by panblosky on Wed, 14 Sep 2005 11:03:37 GMT

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```
>
```

- > Assuming that you are happy with first-order, centered differences, you
- > want something like this

>

- $> grad_x = (SHIFT(phi, -1, 0) SHIFT(phi, 1, 0))/(2.0*dx)$
- $> \text{grad}_y = (\text{SHIFT(phi, 0, -1)} \text{SHIFT(phi, 0, 1)})/(2.0*\text{dy})$

>

- > where phi is the potential It think this handles the periodic boundary
- > conditions properly, but check to make sure.
- > Cheers, Ken Bowman

Thanks Ken, it does work, and really fast!!