Subject: Backlogged question: Drawing vector fields with same scaling in New Graphics
Posted by tianhuachengyue on Tue, 03 Nov 2015 02:02:06 GMT
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This is an unsolved problem about the vector() function in IDL. Gordon used to post this question on the site:
http://compgroups.net/comp.lang.idl-pvwave/drawing-vector-fi elds-with-new-graphics/2090071

But actually it wasn't quite solved:
Is there a way to plot (using New Graphics) two different vector fields on the same set of axes such that the vector fields have the same scaling? Below is a minimal working program. What I want (and sort of expect) is that the v2 vectors be proportionally scaled with respect to the v1 vectors. What I get is that the v2 vectors appear smaller than the v1 vectors, even though they are clearly the same in magnitude.

I followed the suggestions to set v1.length_scale = 2 and
vmag = mean(sqrt(vx^2 + vy^2)),
then set v2.length_scale = 2. / vmag to try to let v2 have the same scale as v1. But clearly it didn't help... Please see my codes below.
Anyone can help me out? Thanks!

```
PRO test_vector

  x = [0.,1.,2.]
  y = [0.,0.,0.]

  vx = [1.,1.,1.]
  vy = [1.,1.,1.]
  vmag = mean(sqrt(vx^2 + vy^2))

  v1 = vector(vx, vy, x, y, $
    XTITLE='X', YTITLE='Y', $
    XRANGE=[-1.,4.], YRANGE=[-1.,4.])
  v1.arrow_thick = 2
  v1.length_scale = 2

  x = [1.,2.]
  y = [1.,1.]
  vx = [-1.0,-1.0]
  vy = [-1.0,-1.0]

  v2 = vector(vx, vy, x, y, $
    /OVERPLOT, XRANGE=[-1.,4.], YRANGE=[-1.,4.])
  v2.arrow_thick = 2
  v2.length_scale = 2. / vmag

END
```

Subject: Re: Backlogged question: Drawing vector fields with same scaling in New Graphics
Posted by chris_torrence@NOSPAM on Mon, 09 Nov 2015 17:20:39 GMT
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On Monday, November 2, 2015 at 7:02:11 PM UTC-7, tianhuachengyue wrote:
> This is an unsolved problem about the vector() function in IDL. Gordon used to post this question on the site:
> http://compgroups.net/comp.lang.idl-pvwave/drawing-vector-fi elds-with-new-graphics/2090071
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> But actually it wasn't quite solved:
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>
> I followed the suggestions to set v1.length_scale = 2 and
> vmag = mean(sqrt(vx^2 + vy^2)),
> then set v2.length_scale = 2. / vmag to try to let v2 have the same scale as v1. But clearly it didn't help... Please see my codes below.
> Anyone can help me out? Thanks!
>
> PRO test_vector
>
> x = [0.,1.,2.]
> y = [0.,0.,0.]
>
> vx = [1.,1.,1.]
> vy = [1.,1.,1.]
> vmag = mean(sqrt(vx^2 + vy^2))
>
> v1 = vector(vx, vy, x, y, $
> XTITLE='X', YTITLE='Y', $
> XRANGE=[-1.,4.], YRANGE=[-1.,4.])
> v1.arrow_thick = 2
> v1.length_scale = 2
>
> x = [1.,2.]
> y = [1.,1.]
> vx = [-1.0,-1.0]
> vy = [-1.0,-1.0]
>
> v2 = vector(vx, vy, x, y, $

> /OVERPLOT, XRANGE=[-1.,4.], YRANGE=[-1.,4.])
> v2.arrow_thick = 2
> v2.length_scale = 2. / vmag
>
> END
>
> Huazeng

Hi Huazeng,

I think you need to scale the second vector by the ratio of the magnitudes. Try this example:

```
x1 = [0.,1.,2.]
y1 = [0.,0.,0.]
vx1 = [3.,1.,1.]
vy1 = [3.,1.,1.]
vmag1 = max(sqrt(vx1^2 + vy1^2))

x2 = [0.5,1.5]
y2 = [0.,0.]
vx2 = [2.0,1.0]
vy2 = [2.0,1.0]
vmag2 = max(sqrt(vx2^2 + vy2^2))
print, vmag1, vmag2

v1 = vector(vx1, vy1, x1, y1, $
  XTITLE='X', YTITLE='Y', $
  XRANGE=[-1.,4.], YRANGE=[-1.,4.])
v1.arrow_thick = 2
v1.length_scale = 4

v2 = vector(vx2, vy2, x2, y2, color='red', $
  /OVERPLOT, XRANGE=[-1.,4.], YRANGE=[-1.,4.])
v2.arrow_thick = 2
v2.length_scale = 4*vmag2/vmag1
```

Cheers,
Chris

Subject: Re: Backlogged question: Drawing vector fields with same scaling in New Graphics
Posted by tianhuachengyue on Wed, 11 Nov 2015 22:15:12 GMT
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Hi Chris,
I tried what you suggested and now the plots are working perfectly! Thanks a lot.

BTW, any trick behind using vmag=max(sqrt(vx^2 + v2^2)) instead using mean(sqrt(vx2^2 + vy2^2)) ?
It seems to me the vector plot setting has sth to do with the maximum values of the two sets of vectors (vx and vy).

Cheers,
Huazeng

Huazeng
--

Subject: Re: Backlogged question: Drawing vector fields with same scaling in New Graphics
Posted by tianhuachengyue on Wed, 11 Nov 2015 22:41:40 GMT
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Hi Chris,

I tried setting v2.length_scale = const*vmag2/vmag1 and now the plots are working perfectly. Thanks for the solution!

BTW, I also tried vmag = mean(sqrt(vx^2+vy^2)) but this didn't work correctly. Any trick behind using vmag = max(sqrt(vx^2+vy^2)) instead using mean(sqrt(vx^2+vy^2))? It seemed to me the vector plot setting is related to the maximum value of vector magnitude.

Cheers,
Huazeng

Subject: Re: Backlogged question: Drawing vector fields with same scaling in New Graphics
Posted by chris_torrence@NOSPAM on Thu, 12 Nov 2015 16:29:35 GMT
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On Wednesday, November 11, 2015 at 3:41:43 PM UTC-7, tianhuachengyue wrote:
> Hi Chris,
>
> I tried setting v2.length_scale = const*vmag2/vmag1 and now the plots are working perfectly. Thanks for the solution!
>
> BTW, I also tried vmag = mean(sqrt(vx^2+vy^2)) but this didn't work correctly. Any trick behind using vmag = max(sqrt(vx^2+vy^2)) instead using mean(sqrt(vx^2+vy^2))? It seemed to me the vector plot setting is related to the maximum value of vector magnitude.
>

> Cheers,
> Huazeng

Hi Huazeng,
Yes, you are correct - it is using the maximum magnitude. Using the mean would be a bad idea, as your maximum vectors might be huge but still have a reasonable mean. You can actually see a lot of this code yourself, in idlitvisvector__define.pro.
Cheers,
Chris
