
Subject: Re: 3D Surface Problem

Posted by [Rick Towler](#) on Sat, 06 Apr 2002 07:06:04 GMT

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"Ken Mankoff" <mankoff@I.HATE.SPAM.cs.colorado.edu> wrote :

- >
- > I am using IDL Object Graphics to combine a Digital Elevation Model
- > (DEM) with a photograph in an attempt to get a pseudo-realistic 3D
- > view of a surface.
- >
- > I have it mostly working, but have a shear effect that I cannot get
- > rid of... I do not fully understand this whole 3D viewpoint thingey.
- > Also, my images shapes vary. Sometimes they cover a 1x1 degree lat/lon
- > grid, other times its a 1x10 (it is not always two squares I am
- > putting together, although the DEM and the image are always the same
- > shape). Also, the DEM sometimes has a range of a few hundred meters,
- > and other times a few thousand meters...

The image shape shouldn't matter as long as you have the correct texcoords and for the most part they look good. It looks like you might have a white background for your non-square images? Is that where the "noise" in the texture comes from or is that a rendering issue?

Where do you think the problem is? Can you render the object correctly and then you botch the transform? Or is the problem before you render a view? There could be a number of possible issues with your examples.

- > Ideally, I would love a function to do this for me that is canned and
- > pre-written. (I will give the author credit on the site, if you are
- > interested in helping, let me know!). But I expect to have to code it
- > up myself. Can anyone see from these images what I am doing wrong? If
- > it will help if I give a code example, let me know and I will post
- > that...

Please post some more detail or code.

-Rick

Subject: Re: 3D Surface Problem

Posted by [Ken Mankoff](#) on Mon, 08 Apr 2002 16:42:27 GMT

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- > "Ken Mankoff" <mankoff@I.HATE.SPAM.cs.colorado.edu> wrote :
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> Please post some more detail or code.

I think the problem is a few things

1) Walls are appearing at the edge of the DEM. Mars has a lot of its surface at below sea-level (negative altitude). But even if I say "dem = dem - min(dem)", so everything should be positive, I still get the "walls"

2) The images always come out square. I am pretty sure this is just a keyword I am missing, but I do not know which one and which object it belongs with (surface? window?).

3) The vertical scaleing is always "0 to 1" in the IDLgrModel (I think). This looks good with maps that cover a large vertical area (say, Olympus Mons or Valles Marineris). But if the map is of a relatively flat area (somewhere in the northern low-lands), and the DEM covers a few hundred meters, then those few hundred meters get streched vertically, and it appears warped.

4) White pixels are appearing in the images.

Here is my code:

FUNCTION vmars, dem, img

;;; image coordinate setup

iDims = size(img, /DIM)

;;; surface coordinate setup

sz = SIZE(dem)

minx = (miny = 0)

maxx = sz[1] - 1 & maxy = sz[2] - 1

maxz = MAX(dem, MIN=minz)

xs = [-minx / (maxx-minx), 1.0 / (maxx-minx)]

ys = [-miny / (maxy-miny), 1.0 / (maxy-miny)]

zs = [-minz / (maxz-minz), 1.0 / (maxz-minz)] ; vert exag

;;; image -> surface coordinates

s = size(dem, /dim)

texcoords = fltarr(2, s[0], s[1])

texcoords[0, *, *] = (findgen(s[0])#replicate(1,s[1])) / (s[0]-1)

texcoords[1, *, *] = (replicate(1,s[1])#findgen(s[0])) / (s[0]-1)

;;; objects creation

window = obj_new('idlgrbuffer');, renderer=1)

view = obj_new('idlgrview' , location=[0,-25])

model = obj_new('idlgrmodel')

rotate = obj_new('idlgrmodel')

translate = obj_new('idlgrmodel')

image = obj_new('idlgrimage', img)

surface = obj_new('idlgrsurface', \$
 dem, \$
 indgen(n_elements(dem[*],0)), \$
 indgen(n_elements(dem[0,*])), \$
 style=2, \$
 color=[255,255,255], \$
 texture_map=image, \$
 texture_coord=texcoords, \$
 shading=1, \$
 xcoord_conv=xs, \$
 ycoord_conv=ys, \$
 zcoord_conv=zs/5., \$
 dataz=dem)

;;; object heirarchy

view->add, translate

translate->add, rotate

rotate->add, model

model->add, surface

```
;;; view setup
rotate->rotate, [0,0,1], 45
rotate->rotate, [1,0,0], -50 ;;; down
translate->translate, 00.00, -0.8, 0.7

;;; display
window->draw, view
window->getProperty, image_data=surface
return, surface
```

END

Subject: Re: 3D Surface Problem
Posted by [David Fanning](#) on Mon, 08 Apr 2002 19:12:57 GMT
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Ken Mankoff (mankoff@I.HATE.SPAM.cs.colorado.edu) writes:

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- > "dem = dem - min(dem)", so everything should be positive, I still
- > get the "walls"
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- > keyword I am missing, but I do not know which one and which object it
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- >
- > 3) The vertical scaleing is always "0 to 1" in the IDLgrModel (I
- > think). This looks good with maps that cover a large vertical area
- > (say, Olympus Mons or Valles Marineris). But if the map is of a
- > relatively flat area (somewhere in the northern low-lands), and the
- > DEM covers a few hundred meters, then those few hundred meters get
- > streched vertically, and it appears warped.
- >
- > 4) White pixels are appearing in the images.

I don't know what the actual problems might be. But I did just now update my Texture_Surface program which maps an image onto a surface. The updates now preserve the aspect ratio of the input surface data (i.e., the data "keeps its shape"). I also added a ZSCALE keyword, which takes a value between 0.001 and 1.0 that provides relative "scaling" of the surface in the Z direction. In other words, if you want a flatter surface, you would type something like this:

```
IDL> Texture_Surface, dem_data, Image=marsImage, ZSCALE=0.25
```

I notice (in both IDL 5.4 and 5.5) that the texture mapping is not always perfect. For example, try this:

```
IDL> Texture_Surface  
IDL> Texture_Surface, Dist(15,30)
```

There will be an extraneous extra row of pixels at about Y=30 on this image, compared to the first. (Some kind of wrapping effect?) It could be that this is what is causing your "wall" problems.

You will also need the Aspect program from my Coyote library to run the program:

```
http://www.dfanning.com/programs/texture_surface.pro  
http://www.dfanning.com/programs/aspect.pro
```

I'd be curious to see your data in my program and see if the problems persist.

Cheers,

David

--

David W. Fanning, Ph.D.
Fanning Software Consulting
Phone: 970-221-0438, E-mail: david@dfanning.com
Coyote's Guide to IDL Programming: <http://www.dfanning.com/>
Toll-Free IDL Book Orders: 1-888-461-0155

Subject: Re: 3D Surface Problem
Posted by [Rick Towler](#) on Mon, 08 Apr 2002 19:22:54 GMT
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Hi Ken.

"Ken Mankoff" <mankoff@I.HATE.SPAM.cs.colorado.edu> wrote :

>

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> 1) Walls are appearing at the edge of the DEM. Mars has a lot of its
> surface at below sea-level (negative altitude). But even if I say
> "dem = dem - min(dem)", so everything should be positive, I still

> get the "walls"

It looks like you have a 2d array of elevational data (dem). Is the data you have placed in it square or do you have some null values (data not square but array is)?

> 2) The images always come out square. I am pretty sure this is just a
> keyword I am missing, but I do not know which one and which object it
> belongs with (surface? window?).

What images? The texture maps? The final image?

The surface will always be square since you are providing x and y vertices that define it as such. I am not a cartographer but I think you will want to specify your surface verts explicitly, and not by indgen. I would assume each datum has a martian lat,lon and an elevation. Do you have routines to convert the lat/lon to x,y on a localized grid?

> 3) The vertical scaling is always "0 to 1" in the IDLgrModel (I
> think). This looks good with maps that cover a large vertical area
> (say, Olympus Mons or Valles Marineris). But if the map is of a
> relatively flat area (somewhere in the northern low-lands), and the
> DEM covers a few hundred meters, then those few hundred meters get
> stretched vertically, and it appears warped.

I hate the *coord_conv keywords. They don't make sense to me outside the context of simple plots. I just settle on a coordinate system for my virtual world, say 1 unit = 1 km, and make sure my vertex data agrees. If you set up your view properly you don't have to worry about scaling

Setting up the view is the trick. You may want to give my camera object a try. It will simplify setting up scene composition and you will be able to place the viewer anywhere in the scene.

<http://www.acoustics.washington.edu/~towler/>

If you don't want to do that, you need to normalize on the min and max of the entire martian surface (or at least the parts you want to plot) not the min and max of the localized data.

> 4) White pixels are appearing in the images.

I would deal with the other issues and this might go away.

In general, I would try to simplify. Fix the vertices first. Create the

surface and view it in xobjview. Forget texturing and don't go any further until you have the verticies sorted out. Then add the texture. Once you get the texture added, deal with the view.

-Rick

Subject: Re: 3D Surface Problem
Posted by [David Fanning](#) on Mon, 08 Apr 2002 19:53:50 GMT
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Rick Towler (rtowler@u.washington.edu) writes:

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> context of simple plots. I just settle on a coordinate system for my
> virtual world, say 1 unit = 1 km, and make sure my vertex data agrees. If
> you set up your view properly you don't have to worry about scaling

This is why I don't write a book. I couldn't even breathe without using coord_conv keywords and really simple coordinate systems (say, 0 to 1) that I can understand!

Cheers,

David

--

David W. Fanning, Ph.D.
Fanning Software Consulting
Phone: 970-221-0438, E-mail: david@dfanning.com
Coyote's Guide to IDL Programming: <http://www.dfanning.com/>
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Subject: Re: 3D Surface Problem
Posted by [btupper](#) on Tue, 09 Apr 2002 01:04:54 GMT
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Hello,

I think Rick has the right idea about providing the xyz locational info for each vertex. Since you are showing images projected on a map, then the original x and y dimensions are lifted from a model of a spheroid and, in their raw unprojected form, will produce a stretched flat map. But all that is out of my league.

On Mon, 8 Apr 2002 10:42:27 -0600, Ken Mankoff

<mankoff@I.HATE.SPAM.cs.colorado.edu> wrote:

>> Please post some more detail or code.

>

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>

> 1) Walls are appearing at the edge of the DEM. Mars has a lot of its

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> relatively flat area (somewhere in the northern low-lands), and the

> DEM covers a few hundred meters, then those few hundred meters get

> stretched vertically, and it appears warped.

>

I have an graphic object model that simplifies process of anisotropic scaling of dimensions

(www.tidewater.net/~pemaquid/axesgroup__define.pro) Basically, it automatically builds simple axes for you. You then take the scaling parameters (*conv_coord, normalized or not) and pass them along to the surface object. It maybe helpful as an example. You will need Martin Schultz's object code distribution and David's NORMALIZE function. The relevant method is ScaleAxes in AXESGROUP. You can play with the three element Isotropic property which specifies relative scaling among the X, Y and Z dimensions.

Here's a mock up of how you might use it. Call both before destroying the first so you can see how setting parts of the underlying dem to NaN gets rid of that ugly edge.

```
IDL> vmars2,axes1
IDL> vmars2,axes2, /nan
```

```
;;;START
```

```
PRO vmars2, axes, nan = nan
```

```

dem = fltarr(35,45)
dem[2:31,2:31] = dem[2:31,2:31]-dist(30) - 8.0
img = bytscl(dem)

if keyword_set(nan) then begin
  a = where(dem GT -8.0, cnt)
  if cnt gt 0 then dem[a] = !Values.f_nan
EndIf

;;; image coordinate setup
iDims = size( img, /DIM )

;;; surface coordinate setup
s = (sz = SIZE( dem,/dim ))
maxz = MAX( dem, MIN=minz,/nan )

Axes = OBJ_NEW('axesgroup', [0, s[0]], [0, s[1]], [minZ, maxZ], $
  style = [15,15,15], $
  xcolor = [255,0,0], $
  ycolor = [0,255,0], $
  zcolor = [0,0,255], $
  exact = [1,1,1], $
  /normalize)

scale = axes->GetScale()
;;; image -> surface coordinates

image = obj_new( 'idlgrimage', img )
surface = obj_new( 'idlgrsurface', $
  dem, $
  style=2, $
  color=[255,255,255], $
  texture_map=image, $
  shading=1, $
  xcoord_conv=scale[*], $
  ycoord_conv=scale[*], $
  zcoord_conv=scale[*], $ )

Axes->Add, surface

xObjView, axes, background = [0,0,0]
end

;;;END

```

> 4) White pixels are appearing in the images.

Are you sure those aren't reflections of grey hair in your monitor?

Ben

Subject: Re: 3D Surface Problem

Posted by [Ken Mankoff](#) on Tue, 09 Apr 2002 04:43:14 GMT

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Hi,

OK, thanks everyone for the good replies. I think I got enough information to fix it. I will have some time in the next week to try these ideas out, and get back to you.

>> 4) White pixels are appearing in the images.

> Are you sure those aren't reflections of grey hair in your monitor?

Hey! I am only 24 (But I think I am starting to go bald).

I hope I will be able to walk away from any programming problem that gives me gray hairs, and I do not think this problem is **that** hard.

Ken.

--

Kenneth Mankoff

LASP://303.492.3264

<http://lasp.colorado.edu/~mankoff/>

<http://lasp.colorado.edu/snoe/>

<http://lasp.colorado.edu/mars/>

<http://lasp.colorado.edu/marsrobot/>
