
Subject: Image plot on back wall

Posted by [raouldukey](#) on Thu, 18 Nov 1999 08:00:00 GMT

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I thought it would be easy to modify the Show3.pro routine to place the image plot on the back wall of the cube instead of the floor. However, after struggling with it for a long time, I find that I am totally confused by the multiple coordinate transformations made. Has anyone got some tips on how to do this?

What I would like

is to create the cube with the shaded surface command, work out the coordinates of the back wall, and use polywarp to work out where to project the image. Then, afterwards replace the shaded surface on the floor of the cube.

I know....I know.....I need to learn object graphics. Any tips would be appreciated!

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Subject: Re: Image plot on back wall

Posted by [robert.mallozzi](#) on Sat, 20 Nov 1999 08:00:00 GMT

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In article <MPG.129f15c03f13cc8e98997e@news.frii.com>, davidf@dfanning.com (David Fanning) writes on IDL object graphics:

> Martin Schultz (m218003@modell3.dkrz.de) shows that the

> Germans do too have a sense of humor when he writes:

>

>> OK. I guess, I see clearer now: it's not objects that I don't like, but

>> the applications that are built on objects! ... Nowadays

>> it seems we have to *talk*

>> to these machines and *ask* them to *please* try to accomplish at least

>> a tiny fraction of what we had in mind.

.

.

.

>

> The thing that absolutely makes object graphics so

> impossible on occasions is that you get absolutely

> no feedback on what has gone wrong. Since *everything*
> is possible, object graphics doesn't care if you
> rotate the surface under the rug where it can't be
> seen. Maybe that is where you intended to put it.
> Meanwhile you sit and stare at an empty screen for
> hours, whispering every incantation you know, hoping
> upon hope that *something* might show up to give you
> your bearings.

Well, I am not sure this will make anyone feel any better, but if you have ever done any OpenGL programming in C, this same situation occurs. You have to set up the view volume, clipping planes, viewpoint, etc. correctly or else you get the ubiquitous black rectangle, with "no feedback on what has gone wrong." More that once I sat there scratching my head wondering why the model is not in the view. Sometimes it helps to start over and put your model at the origin, then apply your transforms in small steps, checking the scene at each step to be sure your model is transforming as you thought.

For a good discussion of setting up 3-d views, take a look at "Computer Graphics" by Foley et al. or "3D Computer Graphics" by Alan Watt.

Regards,

-bob

--

~~~~~  
Robert S. Mallozzi

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Huntsville, AL 35812  
~~~~~

Subject: Re: Image plot on back wall

Posted by [raouldukey](#) on Tue, 23 Nov 1999 08:00:00 GMT

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Here is a quick example of what I did to put the image plot on the back wall, utilizing the Z buffer. It obviously needs a call to Contour or something to put the axis on the image plot.

In doing this, I learned that I really hadn't done this as well as I had previously thought. I was fortunate that in my data, the image data points went to zero on the edges. This made it impossible to tell that I hadn't got the vertical dimension of the image correct.

In creating this example, I stole the bessel function data that David used in his example of object graphics. This didn't go to zero at the edges, so it is obvious to see that I didn't get the size correct. *sigh* I pasted it here because it still shows the use of the Z buffer. Maybe this can all be done in easy to understand normalized coordinates to finally peg it down once and for all. In the mean time, I am lucky because it looks great for my data, even if it isn't correct (after all, we are the only ones that know....)

Raoul

Program to follow...cut and paste style

```
-----
; NAME:
;   newsgroup
;
; PURPOSE:
;   The purpose of this program is just a demonstration
;   of what I did to put an image plot on the back wall
;   of a cube. Basically, all I did was exchange the yz
;   axis at the correct point in the show3.pro routine
;   (sorry RSI). I will cut and paste RSI's routine in
;   to this code, and mark my modications. Sorry about
;   the lack of comments, but complain to RSI, as I can't
;   figure out their code well enough to comment on ;
;   it.
;
;
; AUTHOR: Raouldukey
;
;
; CALLING SEQUENCE:
;   EXAMPLE_SURFACE, data
;
; REQUIRED INPUTS:
```

```

;      None. Fake data will be used if no data is supplied in call.
; (Stole this from David - Thanks!)
;
;
; OPTIONAL INPUTS
;
;      data: A 2D array of surface data.
;
;

```

```

pro newsgroup,image

```

```

;-----

```

```

; Need fake data?

```

```

IF N_Elements(image) EQ 0 THEN BEGIN
  image = BeselJ(Shift(Dist(40,40),20,20)/2,0)
ENDIF

```

```

;-----

```

```

set_plot,'z' ;Set graphics device to the Z buffer

```

```

;-----

```

```

;Get data dimensions

```

```

sizer = size(image)
numberx = sizer[1] ;columns
numbery = sizer[2] ;rows

```

```

if n_elements(x) eq 0 then x = findgen(numberx)
if n_elements(y) eq 0 then y = findgen(numbery)

```

```

;-----

```

```

img = image

```

```

xx = x
yy = y

```

```

ax = 40 ;Tweak Values to get

```



```
t3d,/yzexch
```

```
;-----
```

```
;Back to the show3.pro routine with all of its great comments  
; (thanks RSI)  
;  
; #!P.T is the transformation matrix we set up with shade_surf routine  
; and the xcoor,ycoor correspond to the pixel coordinates of our surface
```

```
p = [[xcoor],[ycoor],[fltarr(4)],[replicate(1,4)]] # !P.T
```

```
u = p[* ,0]/p[* ,3] * !d.x_vsize      ; Scale U coor to device  
v = p[* ,1]/p[* ,3] * !d.y_vsize      ; and v
```

```
u0 = min(u)  
v0 = min(v) ;lower left corner  
sizeu = max(u) - u0 + 1  
sizev = max(v) - v0 + 1      ;Size of new image
```

```
fact = 1  
miss = 0
```

```
;----- Figure out kx, ky for our desired warped surface
```

```
polywarp,xorig,yorig,(u-u0)/fact,(v-v0)/fact,1,kx,ky
```

```
warpedimage = poly_2d(bytescl(img),kx,ky,keyword_set(interp),$  
    sizeu,sizev,missing=miss)
```

```
; -----
```

```
; We now have the image warped vertically. It doesn't seem to be  
; perfect, but not too bad. Now...slide it to the back of the cube  
; with the following numbers in the tv command.
```

```
tv,warpedimage,63,190,xsize = sizeu,ysize=sizev,order=0
```

```
;-----
```

```
; Draw the shaded surface in front of our image
```

```
shade_surf,img,xx,yy,/save,xstyle=1,ystyle=1,zaxis=0,$  
    zrange=[minz,maxz], zstyle=1,az =az,$
```

ax=ax,/noerase,ztickname=notick

```
;-----  
;Get the image from the Z-buffer  
; Adjust device for what you need - PS, Xwin, windows...etc
```

```
finalimage = tvrd()  
set_plot,'win'
```

```
;-----  
;Draw the final image to screen  
  
tv,finalimage
```

end

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Subject: Re: Image plot on back wall
Posted by [davidf](#) on Tue, 23 Nov 1999 08:00:00 GMT
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Raoul (raouldukey@my-deja.com) writes:

> Am I missing something here? Is there a way to make to
> make the screen capture TVRD function, higher quality? Or
> is it just limited by the pixel resolution. This might be
> a stupid question, but does it help if I make the display
> window bigger, plot the image, capture it with TVRD, and
> then shrink the output GIF?

Yes, it helps to increase resolution in the Z-buffer
if you do it correct. Here is an example I posted in
a related article a couple of days ago:

ftp://ftp.dfanning.com/pub/dfanning/outgoing/misc/niceaxisla_bels.pro

Cheers,

David

--

David Fanning, Ph.D.

Fanning Software Consulting

Phone: 970-221-0438 E-Mail: davidf@dfanning.com

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

Toll-Free IDL Book Orders: 1-888-461-0155

Subject: Re: Image plot on back wall

Posted by [raouldukey](#) on Tue, 23 Nov 1999 08:00:00 GMT

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In article <3835B8AE.8CF589CC@wellesley.edu>,
rfrench@mediaone.net wrote:

>

>

> raouldukey@my-deja.com wrote:

>>

>> IT WORKS!

>>

>

> Ok, I'm not going to let you guys off that easily! I've got to see an
> example of this so I can learn how to use the Z buffer, too! Can you
> put together a simple example of this new image plot on the back wall?
> Then the mere mortals among us can try to figure out the coordinate
> transformations and maybe help you avoid having to fiddle it by hand.
> I must say that David's (and Martin's) sample code for object graphics
> has got me quaking in my boots. I'm relieved to know that there is a
way

> to do this using direct graphics!

> Dick French

>

Ok....will try to get that done this afternoon. I have
been out of internet range *gasp* for the last few days.
As far as code that does this correctly, mine isn't going
to be what you are looking for. I just hacked up the
show3.pro code until I got it to project to a vertical
plane. Then I manually slid it back. The Z-buffer
is really easy to use, but the output is not that great,
as it utilizes the TVRD function. Therefore, the output
is on the same quality level as when you make a GIF or JPEG

in this manner - you get the basic idea, but things like axis labels become unreadable.

Am I missing something here? Is there a way to make to make the screen capture TVRD function, higher quality? Or is it just limited by the pixel resolution. This might be a stupid question, but does it help if I make the display window bigger, plot the image, capture it with TVRD, and then shrink the output GIF?

Ok...I had better stop wasting time, and get you some code to examine. BTW, I have wasted a lot of time doing something that I thought would be easy, so if anyone can do this correctly, I will proclaim them super-genius of the world! (not a challenge!) ;)

Raoul

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Subject: Re: Image plot on back wall
Posted by [davidf](#) on Tue, 23 Nov 1999 08:00:00 GMT
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Raoul (raouldukey@my-deja.com) writes:

> In the mean time, I am lucky
> because it looks great for my data, even if it isn't
> correct (after all, we are the only ones that know....)

Ah, I had a sense you were a scientist and not a programmer. :-)

No comment on the code, except to say this. If you save your current graphics device like this:

```
thisDevice = !D.Name
```

Then, when you want to restore it (you return from the Z-buffer, for example), you can do this:

```
Set_Plot, thisDevice
```

This will make your code run for the 0.001% of

the people who are not yet part of the Microsoft team. :-)

Cheers,

David

--

David Fanning, Ph.D.

Fanning Software Consulting

Phone: 970-221-0438 E-Mail: davidf@dfanning.com

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Subject: Re: Image plot on back wall

Posted by [raouldukey](#) on Tue, 23 Nov 1999 08:00:00 GMT

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Ok...once again, I have to apologize for the poor form of my post. You can tell that I am new to posting on newsgroups. Anyway, I am behind a major firewall, so I can't put a nice ftp link to the file, hence my cut and paste technique to put the code in a usable form. However, the editor hacked it all up, so some lines that are meant to be commented out aren't. Let's try this again..... (hopefully I will soon get the hang of this as I think this is a useful forum).

```
; NAME:
;   newsgroup
;
; PURPOSE:
;   The purpose of this program is just a demonstration
;   of what I did to put an image plot on the back wall
;   of a cube. Basically, all I did was exchange the yz
;   axis at the correct point in the show3.pro routine
;   (sorry RSI). I will cut and paste RSI's routine in
;   to this code, and mark my modications. Sorry about
;   the lack of comments, but complain to RSI, as I can't
;   figure out their code well enough to comment on it.
;
;
; AUTHOR: Raouldukey
;
```

```

;
; CALLING SEQUENCE:
;   EXAMPLE_SURFACE, data
;
; REQUIRED INPUTS:
;   None. Fake data will be used if no data is
;   supplied in call.
;   (Stole this from David - Thanks!)
;
; OPTIONAL INPUTS
;
;   data: A 2D array of surface data.
;

```

```

pro newsgroup,image

```

```

;-----

```

```

; Need fake data?

```

```

IF N_Elements(image) EQ 0 THEN BEGIN
  image = BeselJ(Shift(Dist(40,40),20,20)/2,0)
ENDIF

```

```

;-----

```

```

set_plot,'z' ;Set graphics device to the Z buffer

```

```

;-----

```

```

;Get data dimensions

```

```

sizer = size(image)
numberx = sizer[1] ;columns
numbery = sizer[2] ;rows

```

```

if n_elements(x) eq 0 then x = findgen(numberx)
if n_elements(y) eq 0 then y = findgen(numbery)

```

```

;-----

```

```

img = image

```

```
xx = x
yy = y
```

```
;Tweak Values to get it to look
;the way I like (axis angles, max values,etc.)
```

```
ax = 40
az = 30
minz = min(img)
maxz = 3*max(img)
```

```
set_shading,values=[0,150],light=[0,0,1]
```

```
notick=[' ',' ',' ',' ',' ',' ',' ',' ',' ']
```

```
;-----
```

```
;Ok....below here is where I start the copyright
;infringement. The following all belongs to RSI,
;and I have just made modifications to their routines.
; I have stripped it down to the bare bones, just
; to make it more obvious what I have done. You can
; use this as an example to modify the full routine
; of show3.pro
```

```
; Also, I have switched everything to shaded
; surfaces because they
; just look more cool for my data.
```

```
;-----
```

```
; Call shade_surf to get the 3D coordinate matrix
```

```
shade_surf,img,xx,yy,/save,xstyle=1,ystyle=1,$
    zaxis=0,zrange=[minz,maxz],$
    zstyle=1,az = az,ax=ax,ztickname=notick,$
    /nodata
```

```
;x locations of corners
xorig = [x[0],x[numberx-1],x[0],x[numberx-1]]
;y locations of corners
yorig = [y[0],y[0],y[numbery-1],y[numbery-1]]
```

```

; normalized x coordinate
xcoor = xorig * !x.s[1] + !x.s[0]
; normalized y coordinate
ycoor = yorig * !y.s[1] + !y.s[0]

;-----

; I added the following line to rotate the
; xy axis to the vertical as the show3 routine
; projected it to the xy plane already. Obviously,
; the proper way to do this would be to figure
; out the coordinates of the back wall (xz plane)
; and use polywarp to warp it there. I couldn't
; work out how to do this correctly, so good luck!

t3d,/yzexch

;-----

;Back to the show3.pro routine with all of
; its great comments
; (thanks RSI)
;
; #!P.T is the transformation matrix we set up
; with shade_surf routine and the xcoor,ycoor
; correspond to the pixel coordinates of our surface

p = [[xcoor],[ycoor],[fltarr(4)],[replicate(1,4)]] # !P.T

; Scale U coor to device
u = p[* ,0]/p[* ,3] * !d.x_vsize
; and v
v = p[* ,1]/p[* ,3] * !d.y_vsize

u0 = min(u)
v0 = min(v) ;lower left corner

sizeu = max(u) - u0 + 1
sizev = max(v) - v0 + 1 ;Size of new image

fact = 1
miss = 0

;-----

```

```

;   Figure out kx, ky for our desired warped surface

polywarp,xorig,yorig,(u-u0)/fact,(v-v0)/fact,1,kx,ky

warpedimage = poly_2d(bytescl(img),kx,ky,$
  keyword_set(interp),sizeu,sizev,missing=miss)

; -----
; We now have the image warped vertically. It doesn't
; seem to be perfect, but not too bad. Now...slide
; it to the back of the cube with the following
; numbers in the tv command.

tv,warpedimage,63,190,xsize = sizeu,ysize=sizev,order=0

;-----

; Draw the shaded surface in front of our image

shade_surf,img,xx,yy,/save,xstyle=1,ystyle=1,$
  zaxis=0,zrange=[minz,maxz],$
  zstyle=1,az = az,ax=ax,/noerase,$
  ztickname=notick

;-----
;Get the image from the Z-buffer
; Adjust device for what you need
;   (PS, Xwin, windows...etc)

finalimage = tvrd()
set_plot,'win'

;-----

;Draw the final image to screen

tv,finalimage

end

```

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Subject: Re: Image plot on back wall
Posted by [davidf](#) on Wed, 24 Nov 1999 08:00:00 GMT
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Raoul (raouldukey@my-deja.com) writes:

- > Ok...you have convinced me. I am going to order the book.
- > Now....Any of these beat up copies available since I am
- > a grad. student?

I don't have any beat-up copies at the moment, but
there is always a big discount for anyone with
a demonstrated sense of humor. :-)

Send me an e-mail so I can contact you and I'll
give you a price. (I don't want to mention it here.
There would be a huge rush on books and the new
millionaires at UPS would probably strain their
backs hauling them during this holiday season.
I could never forgive myself. :-)

Cheers,

David

--

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

Subject: Re: Image plot on back wall
Posted by [raouldukey](#) on Wed, 24 Nov 1999 08:00:00 GMT
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>

>> In the mean time, I am lucky
>> because it looks great for my data, even if it isn't
>> correct (after all, we are the only ones that know....)
>
> Ah, I had a sense you were a scientist and not a
> programmer. :-)
>

BUSTED! Alright, you caught me. Scientist here....I
don't know anything about programming. If I knew anything
less, then I would be stuck using Insight (*gasp*). If
I knew anything more, then I might be dangerous. :)

> No comment on the code, except to say this. If you
> save your current graphics device like this:
>
> thisDevice = !D.Name

Nice tip...thanks. I figured there had to be an easy
way, but since I usually just write code for myself, I
never worried about it before.

> Coyote's Guide to IDL Programming: <http://www.dfanning.com/>
> Toll-Free IDL Book Orders: 1-888-461-0155

Ok...you have convinced me. I am going to order the book.
Now....Any of these beat up copies available since I am
a grad. student?

Raoul

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Before you buy.
