Subject: Re: how to get scale info from a transform matrix?
Posted by Rick Towler on Tue, 21 Feb 2006 19:14:49 GMT
View Forum Message <> Reply to Message

Weihua FANG wrote:

> Can someone show me how to get scale info of x, y, z axis from the
> transform matrix of a IDLgrModel?

You can really only do this for models that haven't been rotated. A 4x4 scale matrix is defined as:

```
Sx  0   0   0
0  Sy   0   0
0   0  Sz   0
0   0   0   1
```

Where Sx, Sy, and Sz are the x, y and z axis scaling factors respectively. So:

```
DL> oModel=OBJ_NEW('IDLgrModel')
IDL> print, oModel->GetCTM()
      1.0000000      0.00000000      0.00000000      0.00000000
     0.00000000       1.0000000      0.00000000      0.00000000
     0.00000000      0.00000000       1.0000000      0.00000000
     0.00000000      0.00000000      0.00000000       1.0000000
IDL> oModel->Scale, 0.5, 0.5, 0.5
IDL> ctm = oModel->GetCTM()
IDL> print, ctm
     0.50000000      0.00000000      0.00000000      0.00000000
     0.00000000      0.50000000      0.00000000      0.00000000
     0.00000000      0.00000000      0.50000000      0.00000000
     0.00000000      0.00000000      0.00000000       1.0000000
IDL> print, ctm[0,0], ctm[1,1], ctm[2,2]
      0.5000000       0.5000000       0.5000000
IDL> oModel->Scale, 4.0, 4.0, 4.0
IDL> ctm = oModel->GetCTM()
IDL> print, ctm
      2.0000000      0.00000000      0.00000000      0.00000000
     0.00000000       2.0000000      0.00000000      0.00000000
     0.00000000      0.00000000       2.0000000      0.00000000
     0.00000000      0.00000000      0.00000000       1.0000000
IDL> print, ctm[0,0], ctm[1,1], ctm[2,2]
      2.0000000       2.0000000       2.0000000
```

Because rotation matrices apply to some of the same elements of the transform matrix you can't easily determine what scaling was applied in

order to scale, and what "scaling" has been applied due to a rotation.

```
IDL> oModel -> Rotate, [0,1,0], 30.
IDL> ctm= oModel->GetCTM()
IDL> print, ctm
      1.7320508      0.00000000       1.0000000      0.00000000
      0.00000000       2.0000000      0.00000000      0.00000000
      -1.0000000      0.00000000       1.7320508      0.00000000
      0.00000000      0.00000000      0.00000000       1.0000000
IDL> print, ctm[0,0], ctm[1,1], ctm[2,2]
      1.7320508       2.0000000       1.7320508
```

You can work around this by using separate scale and rotation models.

One last thing to note, the *COORD_CONV keywords to the IDLgr objects are an additional scaling factor that is applied to your data before any other transformations. If you need to know exactly what scaling has been applied to your data you need to consider these as well.

-Rick