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Subject: Re: basic 3D data manipulation question

Posted by [Craig Markwardt](#) on Wed, 07 Nov 2001 20:14:36 GMT

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judy.karpen@nrl.navy.mil (Judy Karpen) writes:

> Hi,  
>  
> Sorry for posting if this is an easy question to answer, but so far  
> I've combed the manuals and the netgroup archives without finding one.  
> I don't use IDL all the time, so I am a perpetual beginner  
> unfortunately.  
>  
> I am trying to visualize 3D magnetic field lines, by updating an IDL  
> program written by a colleague that assumes uniformly gridded data. My  
> "data" (simulation results, actually) are on a nonuniform cartesian  
> grid (250x95x95), so my first step is to project the field components  
> onto a uniform grid in all directions. I've found a number of routines  
> that do the opposite --- that is, interpolate a regularly gridded  
> function onto an irregular set of points -- but nothing appropriate.  
> Perhaps I am misunderstanding something in the GRID3 documentation,  
> but it says that the input arrays x,y,z, and f have to have the same  
> number of elements, which rules out having different numbers of points  
> in each direction.

Hi Judy--

I am not sure why the constraints of GRID3 are a problem. What it is asking you to do is label each point with its X Y and Z coordinates. Since you have NXxNYxNZ points, you will need the same number of X values, Y values and Z values.

In the example below I make a 10x10x10 3D array with measurement positions offset slightly by random displacements. I expand the 1D arrays to 3D arrays using the standard REBIN/REFORM technique. I compute a function of these values, a simple quadratic. Finally, I reinterpolate onto a regular grid. The results are quite remarkably good, and it's in full 3D.

Good luck,  
Craig

```
x = findgen(10)+randomn(seed,10)*0.1  ;; Label X Y and Z axes
y = findgen(10)+randomn(seed,10)*0.1
z = findgen(10)+randomn(seed,10)*0.1
xxx = rebin(reform(x,10,1,1),10,10,10) ;; Convert to X Y & Z 3D arrays
yyy = rebin(reform(y,1,10,1),10,10,10)
zzz = rebin(reform(z,1,1,10),10,10,10)
```

```
;; Compute a function of X Y & Z -- a simple quadratic in this case  
fff = xxx^2 + yyy^2 + zzz^2
```

```
;; Create new grid of regularly sampled points  
xnew = findgen(10) & ynew = findgen(10) & znew = findgen(10)
```

```
ff2 = grid3(xxx, yyy, zzz, fff, xnew, ynew, znew, /grid)
```

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Craig B. Markwardt, Ph.D.      EMAIL:  craigmnet@cow.physics.wisc.edu  
Astrophysics, IDL, Finance, Derivatives | Remove "net" for better response  
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