Subject: Dropped dimensions?
Posted by Craig Markwardt on Sun, 28 Mar 1999 08:00:00 GMT
View Forum Message <> Reply to Message

I really enjoy programming in IDL. Because of dynamic typing and dimensioning of variables, and the inherent vector nature of most operators, the language itself can be exceptionally powerful. I find myself doing some very mind-twisting things with ease in IDL, which become very difficult if I have to translate to C.

However, sometimes IDL simply drives me up the wall. No surprise, it's a problem with IDL silently dropping the last dimension of a vector variable. Recently we've seen it causing havoc with matrix multiplication. Here's another example:

Goal: use TOTAL to total one dimension in an array, A. A is three dimensional, but can have any dimensions (ie, it can even be 1x1x1). Typically I want to total the last dimension of the three.

ATTEMPT 1:   **

```
  A = DBLARR(N1, N2, N3)
  ...  processing ...
  TOT = TOTAL(A, 2)
```

ANALYSIS: Looks good right? Wrong, because IDL can silently drop any number of trailing dimensions of size 1 from the array, so occasionally the array doesn't have a third dimension to total. Okay, we can REFORM it and try again.

ATTEMPT 2:   **

```
  A = DBLARR(N1, N2, N3)
  ...  processing ...
  A = REFORM(A, N1, N2, N3, /OVERWRITE)  ; Make sure dimensions are correct
  TOT = TOTAL(A, 2)
```

ANALYSIS: In fact, you will see this formalism a lot in my code. I usually reform an array instinctively after I create it, just to be sure it has the dimensions I ask for! Okay but this still has a problem because sometimes, if A is a 1x1x1 array at the start, the processing can leave only a scalar. Surprise again! Because REFORM() does not accept scalars. So this is what I am left with:

ATTEMPT 3:   **

```
  A = DBLARR(N1, N2, N3)
  ...  processing ...
  IF N_ELEMENTS(A) EQ 1 THEN A = [A]     ; Make sure it's an array
  A = REFORM(A, N1, N2, N3, /OVERWRITE)  ; Make sure dimensions are correct
  TOT = TOTAL(A, 2)
```

ANALYSIS: Okay, this works in most cases. But it's a lot of hoops to jump through for a simple operation.

What is the moral of the story?

For IDL programmers: you have to be very careful about where your array variables get silently REFORMed. REFORM them yourself at critical points.

For RSI:

* REFORM should operate on scalars too.
* TOTAL should ignore missing final dimensions, since those dimensions can be dropped.
* Dimensions should not be dropped! I do appreciate when that happens sometimes, but it usually happens at random and dangerous moments. I would like to have explicit control over when it happens. Something like a RELAX procedure which "relaxes" unneeded final dimensions.

Thanks for staying with me on this tirade. Back to shiny happy thoughts now.

Craig

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