
Subject: Re: Matrix multiplication again...

Posted by [Yngvar Larsen](#) on Wed, 09 May 2012 15:01:30 GMT

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On Tuesday, 8 May 2012 20:45:14 UTC+2, Mats Löfdahl wrote:

> Den tisdagen den 8:e maj 2012 kl. 20:08:02 UTC+2 skrev Yngvar Larsen:

>> On Monday, 7 May 2012 17:40:49 UTC+2, Mats Löfdahl wrote:

>>> Suppose I have an image (let's say 128x128=16384 pixels) and for each pixel there is a vector with maybe 100 (could be more) elements. I organize this as a variable x with 16384 by 100 elements.

>>>

>>> Suppose I also have a 100x100 matrix M (or in general not symmetric but nevermind) and I want to calculate y, which is then also a 16384 by 100 array where

>>>

>>> y[i,*] = M ## x[i,*]

>>

>> Why don't you simply use: y = M##x ?

>

> Probably because I kept thinking of x as a 3D array, in spite of having reformed it to 2D...

Speaking of which: It would be nice if the # and ## operators worked on arrays of more than 2 dimensions (very useful for e.g. tensors or your 3D example). Something like this:

A ~ fltarr(N_1, N_2, ..., N_m, M)

B ~ fltarr(M, P_1, P_2, ..., P_k)

=> size(A # B, /dimensions) = [N_1, N_2, ..., N_m, P_1, P_2, ..., P_k]

I.e. the last dimension of A is "dotted" with the first dimension of B, and the other dimensions are preserved. Most likely it would not alter IDL's internal implementation of # and ## much.

Right now, we have to reform like in the OPs original problem (here with # instead of ##):

A = reform(A, N_1*N_2*...*N_m, M, /overwrite)

B = reform(B, M, P_1*P_2*...*P_k, /overwrite)

C = A # B

C = reform(C, N_1, N_2, ..., N_m, P_1, P_2, ..., P_k, /overwrite)

And analogously for ##.

I use this pattern all the time. No reason that # and ## should not be able to handle this internally so we don't have to.

>> "rows" and "columns" are rather confusing terms in IDL...

>

> I know! I've opted to organize my code so I can always use the ## operator for matrix multiplication. Seems to work so far.

Right. Like I said in my previous, I opted for # for no particular reason, but ## of course works

equally well. One of the arrays will be traversed with a stride in memory either way with these operators. Of course, a third option, let's call it ###, could work like this:

```
A ~ fltarr(N, M)
B ~ fltarr(N, P)
=> size(A ### B, /dimensions) = [M, P]
```

This would most likely be the most efficient way to do matrix multiplication since both arrays are traversed with stride one. If I understand the documentation right, the MATRIX_MULTIPLY function might work this way with smart use of the /ATRANSPOSE and/or /BTRANSPOSE keywords.

--

Yngvar
