Subject: Re: Inner product of multi-dimensional arrays
Posted by thompson on Tue, 07 Feb 1995 15:06:42 GMT
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Fergus Gallagher <f.Gallagher@nerc.ac.uk> writes:

> I want to form a matrix mulipication of the form

> C(i,j,k) = B(i,j,r) A(r,k) (summed over r)

> With some index cleverness, I could form a 4-D intermediate array and
> sum this over one index, but this intermediate array wouldn't fit
> into memory in my case.

> Does anyone have a suitable (fast) algorithhm for this sum. Even
> better would a generalized procedure for

> C = A(.....r.....) B(..r.....)

Try this:

```
DB = (SIZE(B))(1:3)    ;Extract dims.  Assume 3D
DA = (SIZE(A))(1:2)    ;  "       "      "    2D
B = REFORM(B, DB(0)*DB(1), DB(2), /OVERWRITE) ;Reformat into 2D array
C = B # A     ;Calculate result
C = REFORM(C, DB(0), DB(1), DA(1), /OVERWRITE) ;Put into correct format
B = REFORM(B, DB(0), DB(1), DB(2), /OVERWRITE) ;Restore B to original format
```

This technique would only work if the dimension to be summed over is the last
one in B and the first one in A.

I do have a routine called REARRANGE which can rearrange the order of
dimensions in an array. It can found at URL

file://umbra.gsfc.nasa.gov/pub/soho/soft/cds/util/array/rear range.pro

It works best when supported by some CALL_EXTERNAL software written in C, which
can be found at URL

file://umbra.gsfc.nasa.gov/pub/soho/soft/cds/external/

It is designed to operate without this C routine, but it is slower then.

Hope this helps,

Bill Thompson