Subject: How to multiply a matrix by its transpose
Posted by landsman on Fri, 20 Sep 1991 03:54:44 GMT
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I am trying to determine the best way in IDL to multiply a matrix
by its transpose. The elegant IDL solution, for a matrix A

```
C = transpose(A) # A          ;Elegant IDL code
```

requires approximately a factor of two more multiplications than are
really needed (because the output is symmetric). This is the
bottleneck in a linear least squares program I am running which
typically requires an hour of execution time. (The same bottleneck
occurs in the User Library procedure CURVEFIT.)

On the other hand, explicitly taking the inner products of the
the needed columns and rows, i.e.

```
sz = size(A)                    ;Ugly "Fortran" like code
nterm = sz(2)
c = fltarr(nterm,nterm,/NOZERO )
for k=0,nterm-1 do begin              ;Create normal matrix C
     for l=0,k do c(k,l) = total(A(*,k)*A(*,l))
endfor
c = c + transpose(c)
```

is inefficient in IDL because it requires loops over both rows and
columns in the output matrix. Does anyone know of an efficient way
to do this IDL? (I suspect something could be done with the IDL TRED2
routine from "Numerical Recipes" using the "QR decomposition" but I'm
not real familiar with this.)

Thanks,

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