## Subject: Re: matrix multiplication of 2 three-dimensional arrays Posted by thomas.jagdhuber@dlr. on Thu, 21 Aug 2008 10:00:05 GMT View Forum Message <> Reply to Message

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On 20 Aug., 21:53, "thomas.jagdhuber" <thomas.jagdhu...@gmail.com>
wrote:
> On 20 Aug., 18:11, Jeremy Bailin <astroco...@gmail.com> wrote:
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>
>> On Aug 20, 8:22 am, "thomas.jagdhuber" <thomas.jagdhu...@gmail.com>
>> wrote:
>>> Dear experts,
>>> I would like to matrix multiply two matrices with dimensions
>>> [3,3,1500], means: 1500 times a matrix multiplication of 2 matrices
>>> with dimension [3,3]
>>> I could do this with a for loop over the dimension [1500] but i
>>> suppose this is not very elegant. Is there any other way to do this
>>> time-efficient.
>>> Best regards,
>>> thomas
>> My IDL-foo feels strong today... let's see:
>> If A and B are 3x3, then C = A ## B is equivalent to:
>
\Rightarrow q = rebin(indgen(3),3,3)
\rightarrow p = rebin(reform(indgen(3),1,3),3,3)
>> c = total(rebin(reform(a[q,p],1,3,3),3,3,3) * reform(b[*,q],3,3,3), 2)
>> Adding an extra dimension on the end of that gets tricky, but I think
>> the following should work if A and B are each 3x3xNMATRIX and you want
>> C to be a 3x3xNMATRIX array where each C[*,*,i] = A[*,*,i] \#
>> B[*,*,i]:
>> c = total(rebin(reform((a[q,p,*])[0:2,3*lindgen(3),*],1,3,3,nmatrix),
>> 3,3,3,nmatrix) * reform(b[*,q,*],
    3,3,3,nmatrix), 2)
>> Incidentally, does anyone have a better way of doing the (a[q,p,*])
>> [0:2,3*lindgen(3),*] bit of it? The problem is that if A, Q and P are
>> each 3x3 then A[Q,P] is 3x3, but if A is 3x3xN then A[Q,P,*] is 9x9xN.
>> If I see another reform today, I'm going to scream. ;-)
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>> -Jeremy.
> Thank you all, very much!
> I like of course the code of jeremy most, but i think paolo's
> suggestions is the most efficient one. But let us see, i will make
> some investigations...
> Best regards,
> thomas
Here is another suggestion from a very nice collegue:
function matrix_multiply_3, A, B
;---only for quadratic matrices
s = size(A)
N2a = s(2)
N3a = s(3)
s = size(B)
N1b = s(1)
C = make\_array([N1b,N2a,N3a],type=s(4))
for k=0,N2a-1 do begin
for n=0,N1b-1 do begin
C(n,k,^*) = total(A(^*,k,^*) * B(n,^*,^*),1)
endfor
endfor
return, C
end
Advantage: Without rebin it can also handle complex numbers
best regards,
thomas
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