
Subject: Re: Integrator taking vectors as input?

Posted by jschwab@gmail.com on Wed, 26 May 2010 15:18:55 GMT

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> I was wondering if an IDL integrator exists where it can accept
> vectors instead of scalars as inputs for upper and lower limits of the
> integral. I want to apply it to big datasets and I want to avoid using
> loops, which tend to be much slower.

The IDL routines like QROMB accept vector inputs as the limits.

See the documentation (e.g. <http://star.pst.qub.ac.uk/idl/QROMB.html>)
for details.

Josiah

Subject: Re: Integrator taking vectors as input?

Posted by [elias](#) on Thu, 27 May 2010 06:31:38 GMT

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On May 26, 5:18 pm, "jsch...@gmail.com" <jsch...@gmail.com> wrote:

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> Josiah

Thanks a lot,

I tried QROMB and QSIMP, the problem is that they use internally loops
when vectors are provided for the limits. In that case, since my
integrals have constants that they are dependent from the values of
the limits, it doesn't work, since the constants are also vectors
(that I pass in the function I integrate through a COMMON block).

Eg. at a single step of the internal QROMB loop, the limits are
scalars while the constants are vectors. Therefore the code crashes...

Subject: Re: Integrator taking vectors as input?

Posted by [Craig Markwardt](#) on Thu, 27 May 2010 14:35:24 GMT

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On May 27, 2:31 am, Elias <elias.rous...@gmail.com> wrote:

> On May 26, 5:18 pm, "jsch...@gmail.com" <jsch...@gmail.com> wrote:

>

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> Eg. at a single step of the internal QROMB loop, the limits are
> scalars while the constants are vectors. Therefore the code crashes...

It's really up to you. You are really demanding a lot of an integrator: *no* loops and also presumably you want the result to be accurate. I suspect you will need to write your own if it's that important to you. Since most integrators need to subdivide the interval in some way - and hence use a loop - you are presumably limiting your accuracy that can be achieved with a single step of the trapezoidal rule.

Craig

Subject: Re: Integrator taking vectors as input?

Posted by [elias](#) on Thu, 27 May 2010 18:07:10 GMT

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On May 27, 4:35 pm, Craig Markwardt <craig.markwa...@gmail.com> wrote:

> On May 27, 2:31 am, Elias <elias.rous...@gmail.com> wrote:

>

>

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>
>
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> interval in some way - and hence use a loop - you are presumably
> limiting your accuracy that can be achieved with a single step of the
> trapezoidal rule.
>
> Craig

Craig, thanks for the answer

I understand that what I am asking is not easy, I was just wondering if something ready existed. I was not requiring a code without loops. I was simply considering a routine that when I give limits of eg. lower=[a1, b1], upper =[a2, b2] and constants=[c1, c2], that these, the discrete steps in between and the constants are passed to the function that is to be integrated as a vector. QROMB has an internal loop that passes first a1,a2 and then b1, b2 separately. Apart from being more time consuming (I have to apply this to datasets of 100-200

million points (or more since the dataset grows continuously), it also creates problems with my common block - so time is not the only issue.

Anyway, I did manage in the end to include a vectorized integration scheme in my code that uses Simpson's rule and gives an almost identical result as QSIMP (less than 1% difference in the worst case). I still haven't applied it to the big dataset to see how much time I gain, but I am optimistic.

Elias

Subject: Re: Integrator taking vectors as input?

Posted by [wlandsman](#) on Thu, 27 May 2010 19:47:37 GMT

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On May 27, 2:07 pm, Elias <elias.rous...@gmail.com> wrote:

> Anyway, I did manage in the end to include a vectorized integration
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> I still haven't applied it to the big dataset to see how much time I
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>

This might be the time for me to bring up again a complaint I first made in 1997 (<http://tinyurl.com/3xyp3vp>) -- why does QSIMP require the user supplied function to return a *scalar* result. The QSIMP algorithm typically requires thousands of function evaluations on each iteration, and allowing the function to compute these in a single call can give a tremendous speedup. (My *procedure* <http://idlastro.gsfc.nasa.gov/ftp/pro/math/qsimp.pro> allows the function to return a vector result.) --Wayne
