Subject: QSIMP function
Posted by fd_luni on Thu, 12 Sep 2013 13:31:49 GMT
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Instead of using the QSIMP function can I write the code as a summation and use also the Simpson's rule?

Subject: Re: QSIMP function
Posted by wlandsman on Thu, 12 Sep 2013 14:56:20 GMT
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You need to distinguish between 2 cases:

1. You know the function f(x) so that you can it evaluate it at any x. This is the type of problem that QSIMP is meant for. (I prefer to use Craig Markwardt's QPINT1d http://cow.physics.wisc.edu/~craigm/idl/down/qpint1d.pro)

2. You have tabulated X,Y values but no functional form. Here you can do summation of trapezoids (as in http://idlastro.gsfc.nasa.gov/ftp/pro/math/tsum.pro). But if there is any continuity to your function at all, then I would try using INT_TABULATED .

--Wayne

On Thursday, September 12, 2013 9:31:49 AM UTC-4, fd_...@mail.com wrote:
> Instead of using the QSIMP function can I write the code as a summation and use also the Simpson's rule?

Subject: Re: QSIMP function
Posted by fd_luni on Thu, 12 Sep 2013 15:40:03 GMT
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I used before the INT_TABULATED. I want to avoid to make a for loop that is why I am looking how can I make it with summation. You see what I mean?

Subject: Re: QSIMP function
Posted by wlandsman on Thu, 12 Sep 2013 15:49:32 GMT
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On Thursday, September 12, 2013 11:40:03 AM UTC-4, fd_...@mail.com wrote:
> I used before the INT_TABULATED. I want to avoid to make a for loop that is why I am looking how can I make it with summation. You see what I mean?

So you don't want the area under a curve, but you want to get the area (estimated by a trapezoid)

covered by consecutive points. Then the code you posted earlier is fine.

I presume you have millions of points if you are worried about using a FOR loop.

Subject: Re: QSIMP function
Posted by fd_luni on Thu, 12 Sep 2013 15:58:40 GMT
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> So you don't want the area under a curve, but you want to get the area (estimated by a trapezoid) covered by consecutive points. Then the code you posted earlier is fine.

The code for trapezoidal that I posted earlier it does not work very well, I have an underestimation because my data changes fast. That is why I am looking for an alternative method.

> I presume you have millions of points if you are worried about using a FOR loop.

Yeah because it takes me long time with a FOR loop.

Subject: Re: QSIMP function
Posted by wlandsman on Thu, 12 Sep 2013 17:05:05 GMT
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One suggestion for improved accuracy is to interpolate your function at the midpoints of all your tabulated X values. You can use one of the options (e.g. spline,least-squares quadratic) in the INTERPOL() function without needing a loop. Then redo your trapezoidal integration routines but using twice as many points, then rebin your final answer by a factor of two.

On Thursday, September 12, 2013 11:58:40 AM UTC-4, fd_...@mail.com wrote:
>> So you don't want the area under a curve, but you want to get the area (estimated by a trapezoid) covered by consecutive points. Then the code you posted earlier is fine.
>
>
>
> The code for trapezoidal that I posted earlier it does not work very well, I have an underestimation because my data changes fast. That is why I am looking for an alternative method.
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>> I presume you have millions of points if you are worried about using a FOR loop.
>
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>
> Yeah because it takes me long time with a FOR loop.

Subject: Re: QSIMP function
Posted by fd_luni on Thu, 12 Sep 2013 18:01:15 GMT
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How can I use one of the options of INTERPOL() without a loop?

Also I don't understand what you mean to redo my trapezoidal routines using twice as many points

Subject: Re: QSIMP function
Posted by Craig Markwardt on Sat, 14 Sep 2013 05:44:07 GMT
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On Thursday, September 12, 2013 1:05:05 PM UTC-4, wlandsman wrote:
> One suggestion for improved accuracy is to interpolate your function at the midpoints of all your tabulated X values. You can use one of the options (e.g. spline,least-squares quadratic) in the INTERPOL() function without needing a loop. Then redo your trapezoidal integration routines but using twice as many points, then rebin your final answer by a factor of two.

Wayne, Maria asked me about this privately. Does interpolation really improve the accuracy? My first impression would be that it might help, or it might hurt, depending on how well the interpolation routine chosen reflects the underlying nature of the curve being sampled. I don't have any good intuition about how well this works in practice.

Thanks,
Craig

Subject: Re: QSIMP function
Posted by wlandsman on Sun, 15 Sep 2013 02:58:08 GMT
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The point is to interpolate using values at three or more local points, rather than just approximating the curve through consecutive points as a straight line, which is what trapezoidal integration does. INT_TABULATED works by interpolating over 5 points (using cubic spline interpolation). But the OP said that INT_TABULATED was too slow, so I was offering a next step of refinement from trapezoidal integration without being as compute intensive as INT_TABULATED.

--Wayne

On Saturday, September 14, 2013 1:44:07 AM UTC-4, Craig Markwardt wrote:

> Wayne, Maria asked me about this privately. Does interpolation really improve the accuracy? My first impression would be that it might help, or it might hurt, depending on how well the interpolation routine chosen reflects the underlying nature of the curve being sampled. I don't have any good intuition about how well this works in practice.

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>
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> Thanks,
>
> Craig
