
Subject: Re: Strange behavior of /cumulative keyword in total()
Posted by [David Fanning](#) on Tue, 04 Nov 2008 13:38:23 GMT
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Chris writes:

```
> Can anybody explain this?
>
> arr = fltarr( 500000) + .1
> cumul = total(array, /cumulative)
>
> print, (cumul - shift(cumul, 1)) [1 : 10]
> print, (cumul - shift(cumul,1)) [499990:499999]
>
>>  0.100000  0.100000  0.100000  0.100000  0.100000  0.100000
>  0.100000  0.100000  0.100000  0.100000
>
>
>>  0.101562  0.101562  0.101562  0.101562  0.101562  0.101562
>  0.101562  0.101562  0.101562  0.101562
>
> Plotting cumul - shift(cumul,1) is even weirder. I can understand the
> net error of cumul growing over time, as floating point precision
> errors accumulate. However, shouldn't the error between any two
> entries in a cumulative sum not accumulate over the array?
```

Two words: double precision.

```
IDL> arr = fltarr( 500000) + .1D
IDL> cumul = total(arr, /cumulative, /double)
IDL>
IDL> print, (cumul - shift(cumul, 1)) [1 : 10]
    0.10000000  0.10000000  0.10000000  0.10000000
0.10000000  0.10000000  0.10000000  0.10000000
0.10000000  0.10000000
IDL> print, (cumul - shift(cumul,1)) [499990:499999]
    0.10000000  0.10000000  0.10000000  0.10000000
0.10000000  0.10000000  0.10000000  0.10000000
0.10000000  0.10000000
```

Cheers,

David

--

David Fanning, Ph.D.

Subject: Re: Strange behavior of /cumulative keyword in total()

Posted by [jameskuyper](#) on Tue, 04 Nov 2008 16:23:33 GMT

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Chris wrote:

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> Can anybody explain this?
>
> arr = fltarr( 500000) + .1
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>
>
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>  0.101562  0.101562  0.101562  0.101562
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> Plotting cumul - shift(cumul,1) is even weirder. I can understand the
> net error of cumul growing over time, as floating point precision
> errors accumulate. However, shouldn't the error between any two
> entries in a cumulative sum not accumulate over the array?
```

The difference between any two entries in the array should be 0.1,
plus a roundoff error that should be proportional to the value of
cumul. Try this:

```
diff = cumul[1:]-cumul[0:499998]-0.1
nonzero = where(diff ne 0.0)
plot, cumul[nonzero], abs(diff[nonzero]), psym=3, /xlog, /ylog
```

I was also going to say that the roundoff error should be random, but
that doesn't look very random to me.

Subject: Re: Strange behavior of /cumulative keyword in total()

Posted by [Chris\[6\]](#) on Tue, 04 Nov 2008 20:40:38 GMT

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```
> The difference between any two entries in the array should be 0.1,
```

> plus a roundoff error that should be proportional to the value of
> cumul. Try this:

I see - it's not that roundoff errors are accumulating over the sum,
but that differences of 0.1 are expressed less and less precisely as
numbers grow. Too bad the roundoff error isn't random, so that the
effect would wash out...

Thanks for the clarification
chris
