Subject: Re: Incorrect behavior of /NAN
Posted by Craig Markwardt on Thu, 04 Apr 2002 17:32:43 GMT
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Kenneth Bowman <k-bowman@null.tamu.edu> writes:
> I tried to incite some interest in this last week, but had no takers,
> so I'll try again. ;-)
>
> I believe that the behavior of the TOTAL function is incorrect in
> the case where all of the data are NaN and the /NAN keyword is set.
>
> Here are several possible cases:
>
> IDL> a = !values.f_nan
> IDL> print, total([a, 1.0])
> NaN
> IDL> print, total([a, 1.0], /nan)
> 1.00000
> IDL> print, total([a, a])
> NaN
> IDL> print, total([a, a], /nan)
> 0.00000
>
> I believe that the last case is incorrect.
>
> The documentation for /NAN says "Elements with the value NaN are treated
> as missing data." In the last case there are no valid data, so how can
> their sum be zero?

Hi Ken--

If all the data are missing, how can the sum be NaN? Neither a return value of 0, nor a return value of NaN, seems to be appropriate to me. This appears to be an undefined case.

Craig

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---------- ----------
Craig B. Markwardt, Ph.D. EMAIL: craigmnet@cow.physics.wisc.edu
Astrophysics, IDL, Finance, Derivatives | Remove "net" for better response
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Subject: Re: Incorrect behavior of /NAN
Posted by Paul van Delst on Thu, 04 Apr 2002 18:19:00 GMT
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Kenneth Bowman wrote:
>
> I tried to incite some interest in this last week, but had no takers,
> so I'll try again. ;-)
>
> I believe that the behavior of the TOTAL function is incorrect in
> the case where all of the data are NaN and the /NAN keyword is set.
>
> Here are several possible cases:
>
> IDL> a = !values.f_nan
> IDL> print, total([a, 1.0])
> NaN
> IDL> print, total([a, 1.0], /nan)
> 1.00000
> IDL> print, total([a, a])
> NaN
> IDL> print, total([a, a], /nan)
> 0.00000
>
> I believe that the last case is incorrect.
>
> The documentation for /NAN says "Elements with the value NaN are treated
> as missing data." In the last case there are no valid data, so how can
> their sum be zero?
>
> I think this is probably a simple error in the TOTAL algorithm.
> Rather than computing the "sum of all the non-NaN values", it is
> probably doing "set sum to zero and then add all non-Nan values".

Seems reasonable to me. It only sums the data not flagged as missing. If all the data is missing, the sum of nothing is, well, nothing.

> For comparison, the MEAN function does not behave this way.
>
> IDL> print, mean([a, 1.0])
> NaN
> IDL> print, mean([a, 1.0], /nan)
> 1.00000
> IDL> print, mean([a, a])
> NaN
> IDL> print, mean([a, a], /nan)
> NaN

I think the last result *here* is wrong :o) Shouldn't it be 1.0? What is MEAN in this case but:

total([a,a],/NAN) / n_elements(non-nan values only)

Both the numerator and denominator are 0.

> Before I submit something (at least a question) to RSI, does anyone
> have comments?

Yes. Check your data *before* you TOTAL or MEAN them. :o)

paulv

--
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Subject: Re: Incorrect behavior of /NAN
Posted by Jaco van Gorkom on Thu, 04 Apr 2002 18:38:20 GMT
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"Paul van Delst" <paul.vandelst@noaa.gov> wrote in message
news:3CAC9914.B52D1669@noaa.gov...
> Kenneth Bowman wrote:
>> ....
>> IDL> print, mean([a, a], /nan)
>> NaN
>
> I think the last result *here* is wrong :o) Shouldn't it be 1.0? What is
MEAN in this case
> but:
>
> total([a,a],/NAN) / n_elements(non-nan values only)
>
> Both the numerator and denominator are 0.

So you mean that 0 / 0 = 1.0 ? Or 0. / 0. = 1.0 ?
In any case, IDL seems to disagree with you here: :-)

IDL> print, 0./0.
-NaN
% Program caused arithmetic error: Floating illegal operand

IDL> print, 0/0
0
% Program caused arithmetic error: Integer divide by 0

Jaco

Subject: Re: Incorrect behavior of /NAN
Posted by Paul van Delst on Thu, 04 Apr 2002 19:38:51 GMT
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Jaco van Gorkom wrote:
>
> "Paul van Delst" <paul.vandelst@noaa.gov> wrote in message
> news:3CAC9914.B52D1669@noaa.gov...
>> Kenneth Bowman wrote:
>>> ....
>>> IDL> print, mean([a, a], /nan)
>>> NaN
>>
>> I think the last result *here* is wrong :o) Shouldn't it be 1.0? What is
> MEAN in this case
>> but:
>>
>> total([a,a],/NAN) / n_elements(non-nan values only)
>>
>> Both the numerator and denominator are 0.
>
> So you mean that 0 / 0 = 1.0 ? Or 0. / 0. = 1.0 ?
> In any case, IDL seems to disagree with you here: :-)
>
> IDL> print, 0./0.
> -NaN
> % Program caused arithmetic error: Floating illegal operand
>
> IDL> print, 0/0
> 0
> % Program caused arithmetic error: Integer divide by 0
>

Maybe a holistic division operator is required in these sorts of cases. :o)

paulv

--
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Subject: Re: Incorrect behavior of /NAN
Posted by Mark Hadfield on Thu, 04 Apr 2002 21:06:25 GMT
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"Paul van Delst" <paul.vandelst@noaa.gov> wrote in message
news:3CAC9914.B52D1669@noaa.gov...
> Seems reasonable to me. It only sums the data not flagged as missing. If
> all the data is missing, the sum of nothing is, well, nothing.

And IDL normally uses NaN ("Not a Number") to represent nothing. I rest Kenneth's case

Though one could argue that since the IDL language is just a collection of special cases, cobbled together over the years and thinly papered over in places, one cannot say anything about what it *normally* does. Perhaps the RSI developers could start to prove me wrong by fixing this anomaly.

--
Mark Hadfield
m.hadfield@niwa.co.nz Ka puwaha et tai nei
http://katipo.niwa.co.nz/~hadfield Hoea tatou
National Institute for Water and Atmospheric Research (NIWA)

Subject: Re: Incorrect behavior of /NAN
Posted by Craig Markwardt on Fri, 05 Apr 2002 02:26:25 GMT
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Paul van Delst <paul.vandelst@noaa.gov> writes:
>
> Maybe a holistic division operator is required in these sorts of cases. :o)

Or should IDL apply L'Hopital's rule? :-)

Craig

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Craig B. Markwardt, Ph.D. EMAIL: craigmnet@cow.physics.wisc.edu
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Subject: Re: Incorrect behavior of /NAN
Posted by K. Bowman on Fri, 05 Apr 2002 18:20:34 GMT
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In article <onofgz74jo.fsf@cow.physics.wisc.edu>,
Craig Markwardt <craigmnet@cow.physics.wisc.edu> wrote:

> If all the data are missing, how can the sum be NaN? Neither a return
> value of 0, nor a return value of NaN, seems to be appropriate to
> me. This appears to be an undefined case.

If NaN represents missing data, and all of the data are missing, then the total is missing also, so it seems reasonable to me to return NaN.

Ken
