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Subject: Re: Philosophical Question about NAN  
Posted by [Kenneth P. Bowman](#) on Mon, 17 Nov 2008 15:32:24 GMT  
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In article <MPG.238b3491ef337cc798a534@news.giganews.com>,  
David Fanning <news@dfanning.com> wrote:

> Folks,  
>  
> I've had a couple of run-ins lately with NANs and I wonder  
> why routines like TOTAL and MEAN don't have the NAN keyword  
> set to 1 by default. Why does the user have to set it?  
>  
> I understand the argument that the NAN capability was  
> added as an afterthought (or more likely when someone  
> standardized the NAN bit pattern), and so the functionality  
> was added as an optional addition that enhanced the function  
> rather than changed it. But really...is there a reason  
> why it is not the default now?  
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> is useful, certainly. But, typically, once I add a NAN  
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> default values of the COLOR and BITS\_PER\_PIXEL keywords  
> to the PostScript device to something useful by default.  
> That is, an act of negligence on the part of the  
> manufacturer.  
>  
> What say you?  
>  
> Cheers,  
>  
> David

Hi David,

I think they chose correctly and erred on the side of safety.

If I know there are Nans in my data, I'll take care of it.

If there are Nans in the data that I don't expect, I don't want to  
have to set a keyword somewhere to find that out. That is, I don't

want IDL to automatically skip those Nans.

OTOH, I still find this to be frustrating and dangerous

```
IDL> PRINT, TOTAL(REPLICATE(!VALUES.F_NAN, 5), /NAN)
0.00000
```

There are no valid numbers in the input vector, but TOTAL returns a valid FLOAT. This makes the NAN keyword useless in many situations.

Ken

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Subject: Re: Philosophical Question about NAN  
Posted by [wlandsman](#) on Mon, 17 Nov 2008 15:54:44 GMT  
[View Forum Message](#) <> [Reply to Message](#)

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On Nov 17, 9:58 am, David Fanning <n...@dfanning.com> wrote:

> Folks,  
>  
> I've had a couple of run-ins lately with NANs and I wonder  
> why routines like TOTAL and MEAN don't have the NAN keyword  
> set to 1 by default. Why does the user have to set it?

I agree with the sentiment but also note that always setting /NAN incurs a non-trivial performance penalty, e.g.

```
IDL> a = randomn(seed,10000,2000)
IDL> t = systime(1) & b = total(a) & print,systime(1)-t
0.25451803
IDL> t = systime(1) & b = total(a,/nan) & print,systime(1)-t
0.35278893
```

I've thought at times that arrays should carry a hidden bit saying whether or not they include NaN values, but this introduces other overhead problems.

--Wayne

---

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Subject: Re: Philosophical Question about NAN  
Posted by [Rainer](#) on Mon, 17 Nov 2008 16:01:30 GMT  
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I wondered about that myself and speculated that checking for NaNs might decrease performance a little. Never checked this hypothesis,

though.

I often set values deliberately to NaN, so I also need the /NaN keyword most of the time.

Cheers,  
Rainer

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Subject: Re: Philosophical Question about NaN  
Posted by [David Fanning](#) on Mon, 17 Nov 2008 16:02:05 GMT  
[View Forum Message](#) <> [Reply to Message](#)

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wlandsman writes:

```
> I agree with the sentiment but also note that always setting /NaN
> incurs a non-trivial performance penalty, e.g.
>
> IDL> a =3D randomn(seed,10000,2000)
> IDL> t =3D systime(1) & b =3D total(a) & print,systime(1)-t
>    0.25451803
> IDL> t =3D systime(1) & b =3D total(a,/nan) & print,systime(1)-t
>    0.35278893
>
> I've thought at times that arrays should carry a hidden bit saying
> whether or not they include NaN values, but this introduces other
> overhead problems.
```

I guess I would argue that in the overwhelming number of cases in my experience, the performance penalty is trivial. I'm calling these routines a couple of times at most. And I am not arguing for the elimination of the keyword, only that the default value could be changed. Thus, if I *\*was\** experiencing a performance penalty, and I was certain I had good numbers, I could always set the NaN keyword to 0.

Cheers,

David

--

David Fanning, Ph.D.  
Fanning Software Consulting, Inc.  
Coyote's Guide to IDL Programming: <http://www.dfanning.com/>  
Sepore ma de ni thui. ("Perhaps thou speakest truth.")

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Subject: Re: Philosophical Question about NaN

Posted by [wlandsman](#) on Mon, 17 Nov 2008 16:28:27 GMT

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On Nov 17, 11:02 am, David Fanning <n...@dfanning.com> wrote:

And

> I am not arguing for the elimination of the keyword, only  
> that the default value could be changed. Thus, if I \*was\*  
> experiencing a performance penalty, and I was certain I  
> had good numbers, I could always set the NAN keyword to 0.

Yes, I agree with this. I have gotten in the habit of always writing TOTAL(/NAN), but it would be nice if this were the default.

A vaguely related wish of mine is that compile\_opt idl2 finally be made the default. I appreciate that ITTVIS wants to have backward compatibility, but square brackets were introduced 11 years ago, and do we still need default 16 bit integers? If there is anyone who still wants their 11 year old software packages to run without modification, ITTVIS could add a compile\_opt idl1 (or compile\_opt idl\_ancient) command.

--Wayne

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Subject: Re: Philosophical Question about NAN

Posted by [R.Bauer](#) on Tue, 18 Nov 2008 00:38:18 GMT

[View Forum Message](#) <> [Reply to Message](#)

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Sometimes I wish people would use a defined missing value instead on NaN. NaN is only defined for float and double.

If a NaN value is in you data everything can become difficult.

```
IDL> a=[!values.f_nan,0,3,5]
IDL> print,max(a)
      NaN
IDL> print,min(a)
      NaN
IDL> if a[0] gt 1 then print, 'yes' else print, 'no'
no
IDL> if a[0] lt 1 then print, 'yes' else print, 'no'
no
IDL> if a[0] eq 1 then print, 'yes' else print, 'no'
no
```

if you have read until here you may wonder about this

```
IDL> if !values.f_nan eq !values.f_nan then print,'yes' else print, 'no'
no
```

Idl says "no"!!

For functions we can easily set a key so that NaN numbers can be handled differently but if the default is to search for NaN a lot of other places needs a lot of changes.

cheers

Reimar

Kenneth P. Bowman schrieb:

> In article <MPG.238b3491ef337cc798a534@news.giganews.com>,

> David Fanning <news@dfanning.com> wrote:

>

>> Folks,

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>> why routines like TOTAL and MEAN don't have the NAN keyword

>> set to 1 by default. Why does the user have to set it?

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>> I understand the argument that the NAN capability was

>> added as an afterthought (or more likely when someone

>> standardized the NAN bit pattern), and so the functionality

>> was added as an optional addition that enhanced the function

>> rather than changed it. But really...is there a reason

>> why it is not the default now?

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>> over a NAN alerts you to its presence in your data. That

>> is useful, certainly. But, typically, once I add a NAN

>> keyword to my code, I don't know (nor do I or care) if the

>> argument has NANs. Is this lazy programming on my part?

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>> of the NAN keyword to 1 on routines like TOTAL, MEAN,

>> et. al is the functional equivalent of not setting the

>> default values of the COLOR and BITS\_PER\_PIXEL keywords

>> to the PostScript device to something useful by default.

>> That is, an act of negligence on the part of the

>> manufacturer.

>>

>> What say you?

>>

>> Cheers,

>>

>> David

>  
> HI David,  
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> I think they chose correctly and erred on the side of safety.  
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> OTOH, I still find this to be frustrating and dangerous  
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> 0.00000  
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> There are no valid numbers in the input vector, but TOTAL  
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> Ken

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Subject: Re: Philosophical Question about NAN  
Posted by [pgrigis](#) on Tue, 18 Nov 2008 01:07:12 GMT  
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On the other hand,  
NAN works much better than fixed values for  
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even if one has a good yrange).

Ciao,  
Paolo

Reimar Bauer wrote:

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```

> no
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---

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Subject: Re: Philosophical Question about NAN  
Posted by [R.Bauer](#) on Tue, 18 Nov 2008 08:18:31 GMT  
[View Forum Message](#) <> [Reply to Message](#)

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Paolo schrieb:  
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> Ciao,  
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the same is true for Inf values

```
inf = 1.0 / 0
a = [1.0, 2, inf, 4,2]
plot, a
```

```
print, finite(a)
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Just something is possible it does not make it automatically a great solution.

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---

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Subject: Re: Philosophical Question about NAN  
Posted by [Jeremy Bailin](#) on Tue, 18 Nov 2008 13:05:58 GMT  
[View Forum Message](#) <> [Reply to Message](#)

---

On Nov 17, 9:58 am, David Fanning <n...@dfanning.com> wrote:

```
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>
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> --  
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> Fanning Software Consulting, Inc.  
> Coyote's Guide to IDL Programming:<http://www.dfanning.com/>  
> Sepore ma de ni thui. ("Perhaps thou speakest truth.")

My 2 cents... is that about 75% of the time that my data ends up having NaNs in it, it's not intentional and is a sign of something screwy. So by not enabling /NAN by default, debugging becomes much simpler - it's immediately obvious if the result is NaN that something's gone wrong, while it's not obvious if it gives me some real but incorrect number.

-Jeremy.

---

Subject: Re: Philosophical Question about NAN  
Posted by [pgrigis](#) on Tue, 18 Nov 2008 16:42:44 GMT  
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---

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> the same is true for Inf values

Well, when I need to plot data with missing values, I put in NANs in my array. If I wouldn't, I would have to loop over the valid data chunks to do a nice plot...now, we don't want to do that, do we? So I hold on to my point...

Ciao,  
Paolo

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```

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Subject: Re: Philosophical Question about NAN  
Posted by [R.Bauer](#) on Tue, 18 Nov 2008 20:55:31 GMT  
[View Forum Message](#) <> [Reply to Message](#)

---

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> I would have to loop over the valid data chunks  
> to do a nice plot...now, we don't want to do that,  
> do we? So I hold on to my point...  
>  
> Ciao,  
> Paolo  
>

I do understand your point,  
we have tons of finite based routines in our library.

e.g.  
[http://www.fz-juelich.de/icg/icg-1/idl\\_icglib/idl\\_source/idl\\_work/fh\\_lib/f\\_eq.pro](http://www.fz-juelich.de/icg/icg-1/idl_icglib/idl_source/idl_work/fh_lib/f_eq.pro)

My point is that some routines do need a keyword and others not.  
However the default is it should not be mixed up.

And plot should not behave exactly the same for Inf and NaN data. But it  
does. So the result is not well defined.

Reimar

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>>>> no
>>>>
>>>> Idl says "no"!!
>>>>
>>>> For functions we can easily set a key so that NaN numbers can be handled
>>>> differently but if the default is to search for NaN a lot of other
>>>> places needs a lot of changes.
>>>>
>>>> cheers
>>>>
```

```

>>>> Reimar
>>>>
>>>>
>>>> Kenneth P. Bowman schrieb:
>>>> > In article <MPG.238b3491ef337cc798a534@news.giganews.com>,
>>>> > David Fanning <news@dfanning.com> wrote:
>>>> >
>>>> >> Folks,
>>>> >>
>>>> >> I've had a couple of run-ins lately with NANs and I wonder
>>>> >> why routines like TOTAL and MEAN don't have the NAN keyword
>>>> >> set to 1 by default. Why does the user have to set it?
>>>> >>
>>>> >> I understand the argument that the NAN capability was
>>>> >> added as an afterthought (or more likely when someone
>>>> >> standardized the NAN bit pattern), and so the functionality
>>>> >> was added as an optional addition that enhanced the function
>>>> >> rather than changed it. But really...is there a reason
>>>> >> why it is not the default now?
>>>> >>
>>>> >> One could argue, I suppose, that having a program stumble
>>>> >> over a NAN alerts you to its presence in your data. That
>>>> >> is useful, certainly. But, typically, once I add a NAN
>>>> >> keyword to my code, I don't know (nor do I or care) if the
>>>> >> argument has NANs. Is this lazy programming on my part?
>>>> >>
>>>> >> I am just wondering whether not setting the default value
>>>> >> of the NAN keyword to 1 on routines like TOTAL, MEAN,
>>>> >> et. al is the functional equivalent of not setting the
>>>> >> default values of the COLOR and BITS_PER_PIXEL keywords
>>>> >> to the PostScript device to something useful by default.
>>>> >> That is, an act of negligence on the part of the
>>>> >> manufacturer.
>>>> >>
>>>> >> What say you?
>>>> >>
>>>> >> Cheers,
>>>> >>
>>>> >> David
>>>> > HI David,
>>>> >
>>>> > I think they chose correctly and erred on the side of safety.
>>>> >
>>>> > If I know there are Nans in my data, I'll take care of it.
>>>> >
>>>> > If there are Nans in the data that I don't expect, I don't want to
>>>> > have to set a keyword somewhere to find that out. That is, I don't
>>>> > want IDL to automatically skip those Nans.

```

```
>>>> >
>>>> > OTOH, I still find this to be frustrating and dangerous
>>>> >
>>>> > IDL> PRINT, TOTAL(REPLICATE(!VALUES.F_NAN, 5), /NAN)
>>>> >    0.00000
>>>> >
>>>> > There are no valid numbers in the input vector, but TOTAL
>>>> > returns a valid FLOAT. This makes the NAN keyword useless
>>>> > in many situations.
>>>> >
>>>> > Ken
```

---

---

Subject: Re: Philosophical Question about NAN  
Posted by [R.G. Stockwell](#) on Wed, 19 Nov 2008 14:32:43 GMT  
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"David Fanning" <[news@dfanning.com](mailto:news@dfanning.com)> wrote in message  
[news:MPG.238b3491ef337cc798a534@news.giganews.com...](mailto:news:MPG.238b3491ef337cc798a534@news.giganews.com...)  
> Folks,  
>  
> I've had a couple of run-ins lately with NANs and I wonder  
> why routines like TOTAL and MEAN don't have the NAN keyword  
> set to 1 by default. Why does the user have to set it?

My two cents. In spectral analysis, a 'missing point' or NAN has  
a profound effect. The FFT `_must_` have the behaviour it currently  
has (it returns all nans, if there are any nans).

The position/time of each  
measurement is critical in an FFT, and you can't just throw a number away  
and translate all the other points.

Also, it is not clear on how to handle a NAN - it is ambiguous.  
Does one throw the point away (like in a MEAN() calculation), or  
does one interpolate the data (like in an FFT() application)?  
Automated interpolation can be a very bad idea (and what happens  
if the NAN results in an extrapolation, cause there are no surrounding  
points?) Imho, the programmer has to make the decision about how to  
handle NANs.

Also, where data is missing can be important even in functions like MEAN().  
Suppose you have a year of temperature data taken every hour, but in winter,  
you only have daytime data (i.e. NANs at night).  
If you take monthly data, you will get the a very wrong result in terms of  
the

annual variation of monthly means, and it will be artificial, and you won't know about it.

cheers,  
bob

---

---

Subject: Re: Philosophical Question about NAN  
Posted by [Foldy Lajos](#) on Wed, 19 Nov 2008 16:09:09 GMT  
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On Wed, 19 Nov 2008, R.G. Stockwell wrote:

> Also, it is not clear on how to handle a NAN - it is ambiguous.

Even IDL is confused. For a single element input, /cumul in TOTAL should be a no-op. Let's try it:

```
IDL> print, !version  
{ x86_64 linux unix linux 7.0 Oct 25 2007    64    64}  
IDL> a=complex(1.0, !values.f_nan)  
IDL> print, total(a, /nan)  
( 0.00000, 0.00000)  
IDL> print, total(a, /nan, /cumul)  
( 1.00000, 0.00000)
```

regards,  
lajos

---

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Subject: Re: Philosophical Question about NAN  
Posted by [Mark\[1\]](#) on Thu, 20 Nov 2008 00:24:54 GMT  
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I think backward compatibility should be the overriding principle here. So the NAN keyword defaults to unset and COMPILE\_OPT IDL2 remains necessary for the new syntax. There's simply too much old code around that shouldn't be broken unless absolutely necessary.

(Mind you, I pay very little attention to that with my own code, but it's my code so I can do what I want!)

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