Subject: Re: Filtering out NaNs
Posted by sritcey on Thu, 20 Mar 1997 08:00:00 GMT
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Iarla Kilbane-Dawe asked about filetering out NaN's.

The issue of detecting NaNs is a bit of a swamp; having just come out of the muck a while ago, I'd like to add my two cents. [I'm running PVWave, so some of the following may not apply to IDL.]

Stein Vidar suggested using that magical property of IEEE NaN's that they are not even equal to themselves:

```
b= a (where (a eq a))   ; exclude NaN's
```

while Ken Bowman suggested using the FINITE function:

```
b= a (finite (a))       ; exclude .... what?  (see below)
```

In IEEE floating point specification, in addition to ordinary floating point numbers, there are a bunch of special values, among them NaN (``not a number'') and infinity, both positive and negative.

Vidar's technique will exclude NaN's, but not infinities. The approach is widely used, but has been criticized in traditional languages like Fortran, where it has been known to fail because the compiler optimized it away. There is a general consensus that a function to test for NaN-ship is desirable in any language which supports IEEE arithmetic.

Unfortunately, FINITE is not that function. In my PV-Wave documentation, FINITE is described as ``Returns a value indicating if the input is finite or not ... [FINITE(x)] returns 1 if x is infinite or ... NaN''. Thus it seems to do more than the original poster wanted, since it not only flags NaNs, it also flags infinities.

Now maybe that's OK; probably you want to exclude both pathologies when cleaning up a data set. Unfortunately, the PV-Wave implementation is at odds with the documentation (PV-WAVE v6.01 (Advantage), IRIX Release 5.3):

Consider

```
WAVE> mach= machine (/float)
WAVE> a= [0.0, 1.0, mach.nan, 3.0, mach.neg_inf]
WAVE> goodguys= finite (a)
% Program caused arithmetic error: Floating illegal operand
% Detected at $MAIN$   (FINITE).
WAVE> print, goodguys
  1   1   1   1   0
```

So at least on the platform mentioned, FINITE cannot be used to flag
NaN's. Question: Is the documentation wrong, or the implementation?
I personally think that the implementation does what I would prefer;
I would like to see a function ISNAN added.

What exactly does FINITE do on IDL?

Stephen Ritcey (902)494-3313 (voice) (902)494-5191 (fax)
Physics Dept., Dalhousie Univ., Halifax, N.S., Canada B3H 3J5
