Subject: Re: where function not finding value Posted by chris_torrence@NOSPAM on Tue, 10 Mar 2015 19:01:58 GMT View Forum Message Reply to Message

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On Tuesday, March 10, 2015 at 12:12:46 PM UTC-6, Jahvasc wrote:
> Hi, guys,
>
> I have a similar problem but I'm comparing intervals to avoid the float-precision problem. Still, I
can't get the right answer...
>
> I have a vector with 500 values ranging from 0.01 to 0.4 (0.01 to 0.1 by 0.01; 0.2 to 0.4 by 0.1).
> When I use the histogram function I get a certain number of counts for all intervals:
>
        79
                 57
                         48
                                  44
                                          43
                                                   43
>
        30
                 43
                         31
                                  34
                                          25
                                                   14
                                                        9
>
>
> i.e., the value 0.01 appears 79 times, the value 0.02, 57 times, etc.
> However, when I use the where function, I get some "holes". This is the bit of the code I'm
using:
>
> mmod=[findgen(10)*0.01 + 0.01,findgen(3)*0.1 + 0.2]
> massi=0.
> for i=0.12 do begin
   a=where(mass gt massi and mass le mmod(j),count)
   print,massi,mmod(i),count
>
   massi=mmod(j)
> endfor
>
 In this case I get the following numbers:
>
> 0.00000
            0.0100000
                             79
> 0.0100000 0.0200000
                             57
> 0.0200000
               0.0300000
                             48
> 0.0300000
               0.0400000
                             44
> 0.0400000
               0.0500000
                              0
> 0.0500000
               0.0600000
                             43
> 0.0600000
               0.0700000
                             73
> 0.0700000
               0.080000
                             43
> 0.080000
               0.0900000
                              0
> 0.0900000
               0.100000
                             31
> 0.100000
              0.200000
                             59
> 0.200000
              0.300000
                             14
> 0.300000
                              9
              0.400000
>
 When I manually try, for example,
>
```

> a=where(mass gt 0.04 and mass le 0.05,count)

```
> print,count
> I get count=43. What's is going on?
```

Hi Jaqueline,

I think you are running into issues with floating-point precision. On every computer platform (in any language), there are floating-point numbers which are not exactly representable. For example, in IDL, try:

```
IDL> print, 0.1, format='(f25.16)'
    0.1000000014901161
```

If you use a number like 0.1, which isn't exactly representable, for math operations, and you then try to compare that to other numbers, you will get surprising results:

```
IDL> x = 0 \& \text{ for } i=0.99 \text{ do } x = x + 0.1
IDL> print,x
    10.0000
IDL> print,x eq 10
 0
IDL> print,x, format='(f25.16)'
    10.0000019073486330
```

This is just a limitation of doing floating-point math on a computer (nothing to do with IDL).

Hope this helps.

-Chris