Subject: Re: possible bug with center keyword option for FFT
Posted by R.G.Stockwell on Fri, 11 Feb 2011 20:34:53 GMT
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>
>
> "Mark" wrote in message
> news:babf90b7-e4a3-48bc-aecf-ae81e4a055d4@o18g2000prh.google groups.com...
>
>
> 2: According to the documentation, with the center keyword off in
> FFT(), element(0) is the FFT coefficient for the zero frequency. With
> the keyword center set, this coefficient is shifted to the 'center' of
> the array. This is a little ambiguous, especially when an array might
> have an even or odd number of points in a dimension.

You are absolutely correct. This is an error in IDL.

The normal packing is

0 DC value
1/(NT)
2/(NT)
...
(N/2-1)/(NT)
(N/2)/NT = 1/(wT) = special point, IF n is even, aliased nyquist value
-(N/2-1)/(NT)
-(N/2-2)/(NT)
...
-2/NT
-1/NT

So, if you want to "center" it, then you obviously want the most neg freq
which I would say is -(N/2-1)/(NT), but you could arguably say it is the
nyquist (for the even case). There is an ambiguity there.
But, you always want the DC at the "center" followed by all the positive
frequencies.

For the case of 8 points you have
i, freq

0 DC
1 1/N
2 2/N

3 3/N
4 nyquist
5 -3/N
6 -2/N
7 -1/N

So to 'center' it, it must become
i, old i, freq

0 5 -3/N
1 6 -2/N
2 7 -1/N
3 0 DC
4, 1 1/N
5, 2 2/N
6, 3 3/N
7, 4 nyquist

However, it could also be (cause the nyquist is both most neg and most positive)
I, old I, freq

0 4 nyquist
1, 5 -3/N
2, 6 -2/N
3, 7 -1/N
4, 0 DC
5, 1 1/N
6, 2 2/N
7, 3 3/N

Now, either way, IDL is wrong since it has a postive frequency as it's first point, then the nyquist, then the neg freqs.

Here, the DC can go to index 3, or to 4, but NOT to 5.

cheers,
bob

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