
Subject: Re: IDL autocorrelation function

Posted by [Benjamin Hornberger](#) on Wed, 21 Jun 2006 19:37:57 GMT

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yveltje wrote:

> hi!
>
> I need to calculate the autocorrelation function "g" of some signal
> "S", the latter being vector with N elements. I did:
>
> lag = indgen(N)
> g = a_correlate(S, lag)
>
> This works fine for relatively small N, but above ~ 4,000,000 it says
> something like:
> subscript of S : low>0, high<N-1 etc.....
>
> I cannot see in a_correlate.pro why it does this.

I suspect you have integer overflow. The "standard" integer in IDL (and you create an array of that type with the INDGEN function) is a short 16 bit integer, which can hold values from -2^{15} to $+2^{15}-1$, which is -32768 to +32767. Do

IDL> plot, indgen(n)

for n below and above 32767 and you'll see what I mean. The higher values get wrapped over to negative values, and the A_CORRELATE function issues an error when it tries to use those negative values as array subscripts.

It should work if you use 32 bit long integers (LINDGEN instead of INDGEN), or even 64 bit (L64INDGEN) if you go beyond 32 bits.

> I have also tried using the FFT which a lot faster and looks good but
> somehow the normalisation is not the same.

Are you using forward and reverse FFTs correctly? Also, in the A_CORRELATE help it says "the mean is subtracted before correlating". Maybe it has to do with that.

> This all might be simple but
> I am useless with discrete fourier transform. :)
>

I can recommend the excellent book by E. Oran Brigham, "The Fast Fourier Transform". Or Numerical Recipes, you can find it online (free).

Good luck,
Benjamin
