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Subject: Re: Roundoff error in SMOOTH

Posted by [thompson](#) on Wed, 26 May 1999 07:00:00 GMT

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landsman@stars.gsfc.nasa.gov (Wayne Landsman) writes:

> I was recently surprised to discover that applying the SMOOTH function to a  
> non-negative array could yield an array with negative numbers. I give an  
> example below. This problem is evidently due to some sort of roundoff error,  
> since it does not occur when using double precision. But it is not obvious to  
> me how averaging 9 non-negative numbers (for a 3x3 box smooth) could yield a  
> negative number, even allowing for roundoff error.

> Although not obvious from my simple example, this has nothing to do with edge  
> effects -- I originally found the problem when 3x3 smoothing a 1024 x 1024  
> array.

(rest deleted)

My theory is that the SMOOTH function probably uses Fourier transforms to speed  
up the convolution, and this is where the round-off error is sneaking in.

Bill Thompson

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Subject: Re: Roundoff error in SMOOTH

Posted by [landsman](#) on Wed, 26 May 1999 07:00:00 GMT

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In article <26MAY199915495025@stars.gsfc.nasa.gov>, landsman@stars.gsfc.nasa.gov (Wayne  
Landsman) writes...

> I was recently surprised to discover that applying the SMOOTH function to a  
> non-negative array could yield an array with negative numbers. I give an  
> example below.

I forgot to include the IDL !VERSION used in my example:  
{ sparc sunos unix 5.2 Oct 30 1998}

Testing the same example on VMS IDL V4.0.1, I still get negative numbers  
although not as many!

--Wayne Landsman

landsman@mpb.gsfc.nasa.gov

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