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Subject: Digital filter question

Posted by [larkum](#) on Tue, 01 Nov 1994 11:45:04 GMT

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I can't understand description of DIGITAL\_FILTER in the PV-Wave manual. I have some data with an annoying 50Hz mains signal that I'd like to try to filter out. The manual talks about the Nyquist Frequency as  $1/2T$ , where T is the time elapsed between data samples.

Well, I have data sampled at 20 kHz, so as far as I can tell, the Nyquist frequency for this data is 10 000. Am I right? Now what? (besides read a book on digital signal processing). What should my low and high frequencies be to set a bandpass filter around 50 Hz, expressing them as "fractions of the Nyquist frequency" as "numbers between 0 and 1".

Thanks anyone,

Matthew.

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Subject: Re: Digital filter question

Posted by [SOC](#) on Thu, 03 Nov 1994 17:38:26 GMT

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MEL ([larkum@optolab.unibe.ch](mailto:larkum@optolab.unibe.ch)) wrote:

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: filter around 50 Hz, expressing them as "fractions of the  
: Nyquist frequency" as "numbers between 0 and 1".

: Thanks anyone,

I havent used the routine but I expect your 50Hz is just 50/10000

so that the two numbers setting the low and high are 49.5/10000 and 50.5/10000 for a bandpass of 1Hz centered on 50Hz..ie 4.95e-3 and 5.05e-3

Hope this helps...  
Rob

: Matthew.

:

: Matthew Larkum  
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: matthewl@cortex.physiol.su.OZ.AU

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Subject: Re: Digital filter question  
Posted by [alps](#) on Fri, 04 Nov 1994 14:25:05 GMT  
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In <CypD06.7tD@festival.ed.ac.uk> soc@festival.ed.ac.uk (Stephen O'Connell) writes:

> MEL (larkum@optolab.unibe.ch) wrote:  
> : I can't understand description of DIGITAL\_FILTER in the PV-Wave  
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> : Nyquist frequency" as "numbers between 0 and 1".

> : Thanks anyone,

> I havent used the routine but I expect your 50Hz is just 50/10000  
I he is right, except for the part that ..... ^^^^^^^  
should be  $50/2 \cdot 10000$  and similary for the bandpass...

> so that the two numbers setting the low and high are 49.5/10000 and  
> 50.5/10000 for a bandpass of 1Hz centered on 50Hz..ie 4.95e-3 and  
> 5.05e-3

> Hope this helps...

Alps

> : Matthew.

> : \_\_\_\_\_

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Subject: Re: Digital filter question

Posted by [sgs](#) on Fri, 04 Nov 1994 20:49:51 GMT

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MEL (larkum@optolab.unibe.ch) wrote:

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: What should my low and high frequencies be to set a bandpass

: filter around 50 Hz, expressing them as "fractions of the

: Nyquist frequency" as "numbers between 0 and 1".

For 20khz sample rate, the Nyquist frequency is 10khz, and the fraction of nyquist frequency for 50 Hz is 50./10000. For a notch filter try using:

freqlow = 55./10000. ; (note that high and low are reversed for notch)

freqhigh = 45./10000.; (and in order for bandpass)

Be sure to specify enough filter coefficients. I like to increase N and refilter until the filtered data stops changing. The lower the frequencies kept, the more coefficients needed. If you use an fft to filter, rather than convolution, you can use a huge N with good cpu performance. A good reference is "Numerical Recipies in C".

Steve Spray sgs@lmsc.lockheed.com

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