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.

Matthew Larkum
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Internet: larkum@optolab.unibe.ch
matthewl@cortex.physiol.su.OZ.AU

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) wrote:

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- : 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?
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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".

: 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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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:
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- > 50.5/10000 for a bandpass of 1Hz centered on 50Hz..ie 4.95e-3 and
- > 5.05e-3
- > Hope this helps...

## Alps

> : Matthew.

>: Matthew Larkum

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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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: 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".

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@Imsc.lockheed.com