
Subject: Re: Butterworth Band-Pass Filter

Posted by [David Fanning](#) on Sun, 12 Dec 2010 04:37:57 GMT

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burton449 writes:

- > as mentionned in the topic, i want to do a Butterworth Band-Pass
- > Filter on a 9166 X 4600 pixels image.
- >
- > The doc of butterworth.pro in the astrolib explain how to use the
- > script for a lowpass filter, but not for a band-pass and a high-pass.
- >
- > Have any idea how to do?

You need to read my new book. In the meantime, you can find an explanation here:

http://www.dfanning.com/ip_tips/freqfiltering.html

This describes a low-pass filter, but the equation for the high-pass filter is there, too. Just replace the low-pass filter with the high-pass version. :-)

Cheers,

David

--

David Fanning, Ph.D.

Fanning Software Consulting, Inc.

Coyote's Guide to IDL Programming: <http://www.dfanning.com/>

Sepore ma de ni thui. ("Perhaps thou speakest truth.")

Subject: Re: Butterworth Band-Pass Filter

Posted by [burton449](#) on Sun, 12 Dec 2010 16:29:32 GMT

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On Dec 11, 11:37 pm, David Fanning <n...@dfanning.com> wrote:

- > burton449 writes:
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- >> Filter on a 9166 X 4600 pixels image.
- >>
- >> The doc of butterworth.pro in the astrolib explain how to use the
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> David
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> David Fanning, Ph.D.
> Fanning Software Consulting, Inc.
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> Sepore ma de ni thui. ("Perhaps thou speakest truth.")

Thank you again David for your help,

According to your documentation, a high-pass butterworth filter will be defined like that:

$$\text{filter} = 1 / [1 + C(R_o/R)^{2n}]$$

So in IDL, for a cutoff of 15, and `freqImage = FFT(image, -1)`, the filter will be defined like that:

$$\text{filter} = 1.0 / (1.0d + (15.0/\text{freqImage})^2)$$

Is it right?
Thanks again
Max

Subject: Re: Butterworth Band-Pass Filter
Posted by [David Fanning](#) on Sun, 12 Dec 2010 16:56:47 GMT
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burton449 writes:

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> be defined like that:
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>
> So in IDL, for a cutoff of 15, and `freqImage = FFT(image, -1)`, the
> filter will be defined like that:

> filter = 1.0 / (1.0d + (15.0/freqImage)^2)
>
> Is it right?

No, what you are calling freqImage is called freqDomainImage in that example. What you want is something like this:

```
s = Size(image, /Dimensions)
filter = 1.0D / (1.0D + 15.0/Dist(s[0],s[1]))^2)
```

In other words, what you are calling "freqImage" in the filter is actually built with the DIST function, and is different from the freqDomainImage, which is defined like this:

```
freqDomainImage = FFT(image, -1)
```

Cheers,

David

--

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Subject: Re: Butterworth Band-Pass Filter
Posted by [David Fanning](#) on Sun, 12 Dec 2010 17:02:25 GMT
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burton449 writes:

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> be defined like that:
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> So in IDL, for a cutoff of 15, and freqImage = FFT(image, -1), the
> filter will be defined like that:
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>
> Is it right?

For what it's worth, I got confused by all this when I was reading this article, too, in preparation for

including this information in my new book. I think I explained it better in the book, and I'll probably go back and fix this article, too. But not now. I can see the end of this book from where I am standing and I am at the point where bathing is completely extraneous to my purpose! :-)

Cheers,

David

--

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Subject: Re: Butterworth Band-Pass Filter

Posted by [burton449](#) on Sun, 12 Dec 2010 17:07:50 GMT

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On Dec 12, 12:02 pm, David Fanning <n...@dfanning.com> wrote:

> burton449 writes:

>> According to your documentation, a high-pass butterworth filter will
>> be defined like that:

>> filter = 1 / [1 + C(Ro/R)^2n]

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>> filter will be defined like that:

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>> Is it right?

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> I was reading this article, too, in preparation for
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> back and fix this article, too. But not now. I can see
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> David

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> --
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Is it possible to have a look at this book? :)

I dont think you can create a High-Pass filter the way you explain it like your last post or like you explain in the article because you have the division by 0 error when you put the Dist function in denominator... even in your example with dist(248) you have the same error...

Max

Subject: Re: Butterworth Band-Pass Filter
Posted by [David Fanning](#) on Sun, 12 Dec 2010 17:19:26 GMT
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burton449 writes:

> I dont think you can create a High-Pass filter the way you explain it
> like your last post or like you explain in the article because you
> have the division by 0 error when you put the Dist function in
> denominator... even in your example with dist(248) you have the same
> error...

Oh, right. Good point. In the book I actually used a Gaussian high-pass filter, but it should have had the same problem. Humm. I'll have to look at that more closely. I certainly got nice looking output. I wonder why... :-(

Well, you could do something like this:

$(\text{Dist}(s[0],s[1]) > 1e-6)$

> Is it possible to have a look at this book? :)

Probably not. My little experiment to make draft chapters available was a dismal failure. Lots of people downloaded the chapters, but only one person sent me any comments. They were too embarrassed, I guess. :-(

I will be looking for people willing to read the book and help me find typos and these kind of errors, though. Probably after the first of the year. Would you be interested in that?

Cheers,

David

--

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Subject: Re: Butterworth Band-Pass Filter

Posted by [David Fanning](#) on Sun, 12 Dec 2010 17:24:23 GMT

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David Fanning writes:

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> used a Gaussian high-pass filter, but it should
> have had the same problem. Humm. I'll have to
> look at that more closely. I certainly got
> nice looking output. I wonder why... :-(

Oh, with the Gaussian high-pass filter, the
DIST function is in the numerator, not the
denominator. That's why it worked.

I've GOT to clean up around here before my middle
son returns from Nepal, but maybe I'll have a chance
to work through an example later today.

Cheers,

David

--

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Subject: Re: Butterworth Band-Pass Filter
Posted by [burton449](#) on Sun, 12 Dec 2010 17:28:27 GMT
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On Dec 12, 12:19 pm, David Fanning <n...@dfanning.com> wrote:

> burton449 writes:
>> I dont think you can create a High-Pass filter the way you explain it
>> like your last post or like you explain in the article because you
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> (Dist(s[0],s[1]) > 1e-6)
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> draft chapters available was a dismal failure.
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Of course that I am interested! The timing is perfect because I will have one or two months off after the first of the year, and I would like to spend some time learning more IDL. Im not expert but I can test your examples of some chapters if you like.

Max

Subject: Re: Butterworth Band-Pass Filter
Posted by [burton449](#) on Sun, 12 Dec 2010 17:30:06 GMT
[View Forum Message](#) <> [Reply to Message](#)

On Dec 12, 12:19 pm, David Fanning <n...@dfanning.com> wrote:

> burton449 writes:

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