Subject: Displaced errorbars on log-log scale with cgPlot
Posted by atmospheric physics on Tue, 27 Jan 2015 10:20:58 GMT
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Hello,

I was using cgPlot to make the line plot on a log-log scale. I have included the y-axis errors around each data point. I have followed the Coyote Graphics Gallery - 'Error bar plot'. In my plot, I found that for some points the error bars are displaced and above the data point. I guess this is a bug in log-log scaling of error bars!!!

Thanks in advance,
Madhavan

Subject: Re: Displaced errorbars on log-log scale with cgPlot
Posted by David Fanning on Tue, 27 Jan 2015 13:13:12 GMT
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Madhavan Bomidi writes:

> I was using cgPlot to make the line plot on a log-log scale. I have included the y-axis errors around each data point. I have followed the Coyote Graphics Gallery - 'Error bar plot'. In my plot, I found that for some points the error bars are displaced and above the data point. I guess this is a bug in log-log scaling of error bars!!!

It seems unlikely in the absences of evidence. :-)

Cheers,

David
--
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
Coyote's Guide to IDL Programming: http://www.idlcoyote.com/
Sepore ma de ni thue. ("Perhaps thou speakest truth.")

Subject: Re: Displaced errorbars on log-log scale with cgPlot
Posted by atmospheric physics on Wed, 28 Jan 2015 15:25:22 GMT
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Hello David,

Please check the below code and the resulting output:

```
PRO testerr

  xdt = [5, 10, 20, 40, 80, 160, 320, 640, 1280, 2560, 5120, 10240]


  ymean = [ 5.7071102e-07, 1.9411492e-07, 2.4366391e-07, 3.9646722e-07, $
     8.8304703e-07, 3.6161633e-06, 1.5931371e-05, 6.4912913e-05, $
     0.00019788680, 0.00042545785, 0.00033186864, 0.00031074151 ]

  ystd = [ 4.1662774e-07, 2.7208043e-07, 4.5170846e-07, 7.2870838e-07, $
    1.2310552e-06, 3.6163696e-06, 1.4698943e-05, 6.3878156e-05, $
    0.00023048977, 0.00053752256, 0.00033514162, 0.00018645177 ]

  low_yerr = (ymean - ystd)
  high_yerr = (ymean + ystd)

  FigFile = 'testerrplot.ps'

  cgPS_Open,FigFile
  cgDisplay

  cgPlot,xdt,ymean, Font=-1,/XLOG,XStyle=1,YStyle=1, $
    XRange=[100000,1],YRange=[0.000000001,0.1], /YLOG, $
    CharSize=1.2, ERR_YLow=low_yerr, $
    ERR_YHigh=high_yerr, Psym=-16,  $
    ERR_Color='red7',SymColor='red7',Color='red7'

  cgPS_Close

  ; Create a PNG file
  cgPS2Raster,FigFile,/PNG

END
```

Thanks in advance,
Regards,
Madhavan

Subject: Re: Displaced errorbars on log-log scale with cgPlot
Posted by Helder Marchetto on Wed, 28 Jan 2015 15:53:59 GMT
View Forum Message <> Reply to Message

On Wednesday, January 28, 2015 at 4:25:24 PM UTC+1, Madhavan Bomidi wrote:
> Hello David,
>
> Please check the below code and the resulting output:

```
>
> --------------------------------
> PRO testerr
>
>   xdt = [5, 10, 20, 40, 80, 160, 320, 640, 1280, 2560, 5120, 10240]
>
>
>   ymean = [ 5.7071102e-07, 1.9411492e-07, 2.4366391e-07, 3.9646722e-07, $
>     8.8304703e-07, 3.6161633e-06, 1.5931371e-05, 6.4912913e-05, $
>     0.00019788680, 0.00042545785, 0.00033186864, 0.00031074151 ]
>
>   ystd = [ 4.1662774e-07, 2.7208043e-07, 4.5170846e-07, 7.2870838e-07, $
>    1.2310552e-06, 3.6163696e-06, 1.4698943e-05, 6.3878156e-05, $
>    0.00023048977, 0.00053752256, 0.00033514162, 0.00018645177 ]
>
>   low_yerr = (ymean - ystd)
>   high_yerr = (ymean + ystd)
>
>   FigFile = 'testerrplot.ps'
>
>   cgPS_Open,FigFile
>   cgDisplay
>
>   cgPlot,xdt,ymean, Font=-1,/XLOG,XStyle=1,YStyle=1, $
>    XRange=[100000,1],YRange=[0.000000001,0.1], /YLOG, $
>    CharSize=1.2, ERR_YLow=low_yerr, $
>    ERR_YHigh=high_yerr, Psym=-16,  $
>    ERR_Color='red7',SymColor='red7',Color='red7'
>
>   cgPS_Close
>
>   ; Create a PNG file
>   cgPS2Raster,FigFile,/PNG
>
> END
> -----------------------------------
>
> Thanks in advance,
> Regards,
> Madhavan
```

Hi,
that's because the errors are automatically added to the y values. According to David's documentation:

```
;     err_yhigh: in, optional
;         The high error values that should be added to the dependent or Y data values.
;     err_ylow: in, optional
```

; The low error values that should be subtracted from the dependent or Y data values.

therefore if you change:
 low_yerr = (ymean - ystd)
  high_yerr = (ymean + ystd)
to
 low_yerr = ystd
 high_yerr = ystd

Then comes the real problem... Did you look at the numbers? So here it goes:
 1.54083e-007
-7.79655e-008
-2.08045e-007
-3.32241e-007
-3.48008e-007
-2.06455e-010
 1.23243e-006
 1.03476e-006
-3.26030e-005
 -0.000112065
-3.27296e-006
  0.000124290

Now the graphics has to place errorbars for negative values. If you select only positive values (4 of them), the plot looks fine:

```
  goodVals = where(ymean-ystd gt 0.0, cnt)
ymean = ymean[goodVals]
ystd = ystd[goodVals]
xdt = xdt[goodVals]
cgDisplay, 600, 600, WID=1, Title='log-log'
  cgPlot,xdt,ymean, Font=-1,/XLOG,XStyle=1,YStyle=1, $
    XRange=[100000,1],YRange=[0.000000001,0.1], /YLOG, $
    CharSize=1.2, ERR_YLow=ystd, $
    ERR_YHigh=ystd, Psym=-16,  $
    ERR_Color='red7',SymColor='red7',Color='red7'
```

Cheers,
Helder

Subject: Re: Displaced errorbars on log-log scale with cgPlot
Posted by Helder Marchetto on Wed, 28 Jan 2015 15:55:49 GMT
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On Wednesday, January 28, 2015 at 4:54:01 PM UTC+1, Helder wrote:
> On Wednesday, January 28, 2015 at 4:25:24 PM UTC+1, Madhavan Bomidi wrote:
>> Hello David,

```
>>
>>  Please check the below code and the resulting output:
>>
>>  --------------------------------
>>  PRO testerr
>>
>>    xdt = [5, 10, 20, 40, 80, 160, 320, 640, 1280, 2560, 5120, 10240]
>>
>>
>>    ymean = [ 5.7071102e-07, 1.9411492e-07, 2.4366391e-07, 3.9646722e-07, $
>>       8.8304703e-07, 3.6161633e-06, 1.5931371e-05, 6.4912913e-05, $
>>       0.00019788680, 0.00042545785, 0.00033186864, 0.00031074151 ]
>>
>>    ystd = [ 4.1662774e-07, 2.7208043e-07, 4.5170846e-07, 7.2870838e-07, $
>>      1.2310552e-06, 3.6163696e-06, 1.4698943e-05, 6.3878156e-05, $
>>      0.00023048977, 0.00053752256, 0.00033514162, 0.00018645177 ]
>>
>>    low_yerr = (ymean - ystd)
>>    high_yerr = (ymean + ystd)
>>
>>    FigFile = 'testerrplot.ps'
>>
>>    cgPS_Open,FigFile
>>    cgDisplay
>>
>>    cgPlot,xdt,ymean, Font=-1,/XLOG,XStyle=1,YStyle=1, $
>>      XRange=[100000,1],YRange=[0.000000001,0.1], /YLOG, $
>>      CharSize=1.2, ERR_YLow=low_yerr, $
>>      ERR_YHigh=high_yerr, Psym=-16,  $
>>      ERR_Color='red7',SymColor='red7',Color='red7'
>>
>>    cgPS_Close
>>
>>    ; Create a PNG file
>>    cgPS2Raster,FigFile,/PNG
>>
>>  END
>>  -------------------------------------
>>
>>  Thanks in advance,
>>  Regards,
>>  Madhavan
>
>  Hi,
>  that's because the errors are automatically added to the y values. According to David's
documentation:
>
>  ;     err_yhigh: in, optional
```

> ; The high error values that should be added to the dependent or Y data values.
> ; err_ylow: in, optional
> ; The low error values that should be subtracted from the dependent or Y data values.
>
> therefore if you change:
> low_yerr = (ymean - ystd)
> high_yerr = (ymean + ystd)
> to
> low_yerr = ystd
> high_yerr = ystd
>
> Then comes the real problem... Did you look at the numbers? So here it goes:
> 1.54083e-007
> -7.79655e-008
> -2.08045e-007
> -3.32241e-007
> -3.48008e-007
> -2.06455e-010
> 1.23243e-006
> 1.03476e-006
> -3.26030e-005
> -0.000112065
> -3.27296e-006
> 0.000124290
>
> Now the graphics has to place errorbars for negative values. If you select only positive values (4 of them), the plot looks fine:
>
> goodVals = where(ymean-ystd gt 0.0, cnt)
> ymean = ymean[goodVals]
> ystd = ystd[goodVals]
> xdt = xdt[goodVals]
> cgDisplay, 600, 600, WID=1, Title='log-log'
> cgPlot,xdt,ymean, Font=-1,/XLOG,XStyle=1,YStyle=1, $
> XRange=[100000,1],YRange=[0.000000001,0.1], /YLOG, $
> CharSize=1.2, ERR_YLow=ystd, $
> ERR_YHigh=ystd, Psym=-16, $
> ERR_Color='red7',SymColor='red7',Color='red7'
>
> Cheers,
> Helder

Ups... a line went missing.
The values showed are a result of
print, ymean-ystd
1.54083e-007
-7.79655e-008
-2.08045e-007

-3.32241e-007
-3.48008e-007
-2.06455e-010
 1.23243e-006
 1.03476e-006
-3.26030e-005
 -0.000112065
-3.27296e-006
  0.000124290

sorry for missing that.

Cheers,
Helder

Subject: Re: Displaced errorbars on log-log scale with cgPlot
Posted by David Fanning on Wed, 28 Jan 2015 15:58:32 GMT
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Madhavan Bomidi writes:

>
> Hello David,
>
> Please check the below code and the resulting output:
>
> --------------------------------
> PRO testerr
>
> xdt = [5, 10, 20, 40, 80, 160, 320, 640, 1280, 2560, 5120, 10240]
>
>
> ymean = [5.7071102e-07, 1.9411492e-07, 2.4366391e-07, 3.9646722e-07, $
>   8.8304703e-07, 3.6161633e-06, 1.5931371e-05, 6.4912913e-05, $
>   0.00019788680, 0.00042545785, 0.00033186864, 0.00031074151]
>
> ystd = [4.1662774e-07, 2.7208043e-07, 4.5170846e-07, 7.2870838e-07, $
>   1.2310552e-06, 3.6163696e-06, 1.4698943e-05, 6.3878156e-05, $
>   0.00023048977, 0.00053752256, 0.00033514162, 0.00018645177]
>
> low_yerr = (ymean - ystd)
> high_yerr = (ymean + ystd)
>
> FigFile = 'testerrplot.ps'
>
> cgPS_Open,FigFile
> cgDisplay

```
>
>   cgPlot,xdt,ymean, Font=-1,/XLOG,XStyle=1,YStyle=1, $
>     XRange=[100000,1],YRange=[0.000000001,0.1], /YLOG, $
>     CharSize=1.2, ERR_YLow=low_yerr, $
>     ERR_YHigh=high_yerr, Psym=-16,  $
>     ERR_Color='red7',SymColor='red7',Color='red7'
>
>   cgPS_Close
>
>   ; Create a PNG file
>   cgPS2Raster,FigFile,/PNG
>
> END
> ------------------------------------
```

It appears to me you are giving me numbers that it is impossible to take the log of:

```
IDL> print, alog10(low_yerr)
    -6.81224        -NaN        -NaN        -NaN        -NaN
-NaN    -5.90924    -5.98516        -NaN
       -NaN        -NaN    -3.90556
```

The "problem" values are those that can't be calculated.

I guess the real problem might be understanding why errors are not being thrown by cgPlot. I'll look into it.

Cheers,

David

--
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
Coyote's Guide to IDL Programming: http://www.idlcoyote.com/
Sepore ma de ni thue. ("Perhaps thou speakest truth.")