Subject: Help with least squares on non-linear function
Posted by stefan.meingast on Sat, 24 Aug 2013 19:14:55 GMT
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Hey

I finally want to enjoy at least some time of the weekend, but I am stuck at one problem tonight for which I still would like to find a solution.

I have a bunch of measurements in an array y which depending basically on another variable x. I want to do a least-squares fit to a non-linear function, which would be very easy if I just wanted e.g. a polynomial fit. My problem is now that there is another parameter coming into play (here: k), so the function I want to fit in the end looks like this (though the order should be variable in the end which in this example is set to 3):

https://dl.dropboxusercontent.com/u/16787607/formula.jpg

where the a_i are the coefficients I want to determine.

I have been trying to figure out what the best way might be to do such a fit, but this turns out to be much more complicated than I thought...

I hope some of you may have a hint

many thanks!!!
:)

Subject: Re: Help with least squares on non-linear function
Posted by stefan.meingast on Sat, 24 Aug 2013 19:20:52 GMT
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Ah, one more thing:

The k changes for each y so it is not constant across all measurements...

Subject: Re: Help with least squares on non-linear function
Posted by Phillip Bitzer on Sat, 24 Aug 2013 21:10:45 GMT
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Is k known a priori? In other words, do you know what k is for each measurement?

Subject: Re: Help with least squares on non-linear function
Posted by stefan.meingast on Sat, 24 Aug 2013 21:32:41 GMT

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Am Samstag, 24. August 2013 23:10:45 UTC+2 schrieb Phillip Bitzer:
> Is k known a priori? In other words, do you know what k is for each measurement?

Yes, I know k. Actually, I just realised that k is equal to 1/X, so this makes things a lot easier. I am currently experiemnting with MPFIT where you can define any function you want to fit. This looks very promising so far.

Subject: Re: Help with least squares on non-linear function
Posted by Phillip Bitzer on Sat, 24 Aug 2013 21:53:39 GMT
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Yep, that was the next piece of advice :-) MPFIT is highly recommended....

Subject: Re: Help with least squares on non-linear function
Posted by Heinz Stege on Sun, 25 Aug 2013 12:40:42 GMT
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On Sat, 24 Aug 2013 14:53:39 -0700 (PDT), Phillip Bitzer wrote:

> Yep, that was the next piece of advice :-) MPFIT is highly recommended....

I would say, this is a linear function. Here is a way how to calculate
the fit parameters.

Put your x, k and y values into the arrays
```
  x=dblarr(npoints)
  k=dblarr(npoints)
  y=dblarr(npoints)
```

With npars=3, create the matrix
```
  fx=dblarr(npoints,npars)
  for i=1,npars do fx[0,i-1]=((1+k)^i-k^i)*x^i
```

and do the calculation
```
  temp=transpose(fx)
  a=temp#fx
  b=temp#y
  ludc,a,indx
  par=lusol(a,indx,b)
```

par is an array with npars elements and should contain the fit
parameters named by a_i within your function.

I hope, that there is no error in this code. I couldn't test it,

because I have no example values for x, k and y.

Cheers, Heinz