Subject: Another MPFIT question
Posted by MichaelT on Sat, 11 Oct 2008 21:35:18 GMT
View Forum Message <> Reply to Message

Today I discovered MPFIT and I am so excited how well it works (many thanks Craig!).

I ran into one problem, however, which I was not able to solve. Maybe, there is a simple solution.
Among all the parameters I have four whose sum must not be larger than a certain value:

0 < c1+c2+c3+c4 < 1.

All four parameters may vary between zero and one which I implemented using .limits and .limited. But, how do I implement the additional constraint? Any ideas? It may be too obvious for me to see...

Thanks, Michael

Subject: Re: Another MPFIT question
Posted by Craig Markwardt on Mon, 13 Oct 2008 10:06:07 GMT
View Forum Message <> Reply to Message

MichaelT <michael.theusner@googlemail.com> writes:

> Today I discovered MPFIT and I am so excited how well it works (many
> thanks Craig!).
>
> I ran into one problem, however, which I was not able to solve. Maybe,
> there is a simple solution.
> Among all the parameters I have four whose sum must not be larger than
> a certain value:
>
> 0 < c1+c2+c3+c4 < 1.
>
> All four parameters may vary between zero and one which I implemented
> using .limits and .limited. But, how do I implement the additional
> constraint? Any ideas? It may be too obvious for me to see...

The short answer is that MPFIT does not handle complex inequality constraints, only simple box boundary constraints on each parameter. Vince's suggestion of re-expressing with different parameters is a good one, but as you discovered, all the constraints become difficult.

You may be able to cheat. You could append a special data point which contributes "badness" whenever the parameters go outside of their

desired bounds. For example, if you have 100 data points, you would
append a 101st residual, computed something like this,

```
  big = 100           ; Bigger than your biggest residual
  cc = c1+c2+c3+c4    ; Total
  cclimits = [0d, 1d]  ; Limits on total
  toler = 0.001d      ; Tolerance on limits
  yy = (1-tanh((cc-cclimits(0))/toler))/2 + (1+tanh((cc-cclimits(1))/toler))/2

  resid[101] = big*yy
```

Since MPFIT simply tries to minimize residuals, the presence of one
more residual will be handled just fine. As long as the parameters
are within constraints, the 101st residual contributes nothing, but if
they begin to touch the constraint, resid[101] will start to grow, and
hopefully repel the fitter from going that direction. All untested of
course.

The TANH() functions make an inverse box-car shape, but with smooth
edges. The smoothness is key, otherwise the fitter will rightly fail
due to discontinuities.

Craig

--

 -- ----------
Craig B. Markwardt, Ph.D.   EMAIL: cbmarkwardt+usenet@gmail.com
 -- ----------

Subject: Re: Another MPFIT question
Posted by MichaelT on Tue, 14 Oct 2008 09:26:42 GMT
View Forum Message <> Reply to Message

> You may be able to cheat. You could append a special data point which
> contributes "badness" whenever the parameters go outside of their
> desired bounds. For example, if you have 100 data points, you would
> append a 101st residual, computed something like this,

Thanks, Craig! I'll try it out tonight and report back how well it
worked in my case.

Mchael

Subject: Re: Another MPFIT question
Posted by MichaelT on Tue, 14 Oct 2008 20:00:39 GMT

View Forum Message <> Reply to Message

Hi again, I just tried it and it works perfectly! Thanks again!

Michel

Subject: Re: Another MPFIT question
Posted by Craig Markwardt on Wed, 15 Oct 2008 11:22:32 GMT
View Forum Message <> Reply to Message

MichaelT <michael.theusner@googlemail.com> writes:
> Hi again, I just tried it and it works perfectly! Thanks again!

Huh. That actually blows my mind. I've never tried that before!

Craig

--
---------- ----------
Craig B. Markwardt, Ph.D. EMAIL: cbmarkwardt+usenet@gmail.com
---------- ----------

Subject: Re: Another MPFIT question
Posted by jgrimmond on Thu, 06 Nov 2008 22:03:10 GMT
View Forum Message <> Reply to Message

On 15 Oct 2008 07:22:32 -0400, Craig Markwardt
<craigmnet@REMOVEcow.physics.wisc.edu> wrote:

Craig,

> MichaelT <michael.theusner@googlemail.com> writes:
>> Hi again, I just tried it and it works perfectly! Thanks again!
>
> Huh. That actually blows my mind. I've never tried that before!
>
> Craig

You are mimicking the penalty function approach to
constraints! (Unless, I am really missing something
here ....).

jg

Subject: Re: Another MPFIT question
Posted by Craig Markwardt on Sat, 08 Nov 2008 16:23:44 GMT
View Forum Message <> Reply to Message

On Nov 6, 5:03 pm, jgrimm...@yahoo.com wrote:
> On 15 Oct 2008 07:22:32 -0400, Craig Markwardt
>
> <craigm...@REMOVEcow.physics.wisc.edu> wrote:
>
> Craig,
>
>> MichaelT <michael.theus...@googlemail.com> writes:
>>> Hi again, I just tried it and it works perfectly! Thanks again!
>
>> Huh. That actually blows my mind. I've never tried that before!
>
>> Craig
>
> You are mimicking the penalty function approach to
> constraints! (Unless, I am really missing something
> here ....).

Right, I understand that. The mind-blowing part was that it worked on the first try :-)