Subject: Re: TNMIN limits
Posted by Brian Larsen on Mon, 03 Dec 2007 13:08:06 GMT
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While admittedly I have not used TNMIN before, it is often good practice to use several different methods of function minimization on the given problem. There are issues associated with each solver, what it requires ad what it can handle. For instance there is a class of solvers that require derivatives and a class that don't. If your function has regions that are not differential then that method will have issues... there is a list in idl of built-in minimization routines (there are 5-6). Everyone has their own favorite but I often use ameoba() first, it doesn't need derivatives and seems to work well and fast. The function that you are minimizing has to be written to enforce limits on variables but thats not too bad to do,

a few web resources:
ameoba (a c code base but lots of good information)
http://solar.physics.montana.edu/kankel/ph567/examples/minim ization/
conjugate-gradient:
http://solar.physics.montana.edu/kankel/ph567/resources/conj ugate_gradient/

Cheers,

Brian

Brian Larsen
Boston University
Center for Space Physics

Subject: Re: TNMIN limits
Posted by Brian Larsen on Mon, 03 Dec 2007 13:12:19 GMT
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And here is a great discussion of ameoba and how it works...
http://solar.physics.montana.edu/kankel/ph567/examples/minim ization/amoeba/Notes.pdf

Cheers,

Brian

Brian Larsen
Boston University

Center for Space Physics

Subject: Re: TNMIN limits
Posted by d.poreh on Mon, 03 Dec 2007 13:43:14 GMT
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On Dec 3, 2:12 pm, Brian Larsen <balar...@gmail.com> wrote:
> And here is a great discussion of ameoba and how it works...http://solar.physics.montana.edu/kankel/ph567/exampl es/minimization/a...
>
> Cheers,
>
> Brian
>
> --- --------------
> Brian Larsen
> Boston University
> Center for Space Physics

Hi Brian;
Would you please specify this method with a simple example in IDL? I'm
interesting in this method but I can't make the head and tail of it.
Thanks in advance
Cheers

Subject: Re: TNMIN limits
Posted by Brian Larsen on Mon, 03 Dec 2007 14:36:17 GMT
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> Hi Brian;
> Would you please specify this method with a simple example in IDL? I'm
> interesting in this method but I can't make the head and tail of it.

Sure,

the example in help is not to bad either, I use it every time I go to
use the routine.

save this toy example as amoeba_test.pro then just .run amoeba_test

```
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;   .run amoeba_test

FUNCTION min_me, P
;; function is the negative of the dist function
  RETURN, -(dist(100))[p[0],p[1]]
```

```
;; probably should have put in some error checking as this will error
if p<0 or p>99
END

; we start at P0
p0 = [67,45]                    ; random guess
;; you have to play with scale, it is in some sense the step size that
;; the amoeba uses, the smaller the closer to the answer but the
;; bigger chance of getting lost and taking forever
ans = amoeba(1e-5, p0=p0, scale=5, FUNCTION_name='min_me')
print, ans, -(dist(100))[ans[0], ans[1]]
;; lets check the answer
print, min(-dist(100))
;; which should be the right answer
end
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

IDL> .run amoeba_test
% Compiled module: MIN_ME.
% Compiled module: $MAIN$.
      50.4927      50.1697
     -70.7107
     -70.7107
```

So we get the right answer. Great routine.

I will probably write something up and post it along with the description from Charles Kankelborg (assuming he gives me the ok) on my idl tips site, not as good as David Fanning's or Michael Galloy's but just trying to be mathy and let them do coding and especially graphics.
http://people.bu.edu/balarsen/Home/IDL/IDL.html

Ask away if you have any more issues, I have a lot of experience in beating this routine into submission. Forcing limits on the input variables happens in the function, you need to do something like if the value to too big or too small then return a large number so the amoeba will step away from that.

Cheers,

Brian

-- --------------

Brian Larsen
Boston University

Subject: Re: TNMIN limits
Posted by biophys on Tue, 04 Dec 2007 07:27:18 GMT
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Hi, Brain

Thanks for bringing my attention to amoeba. The function I'm
minimizing contains infinite summation of integral terms containing
Gamma functions and Bessel functions etc. My TNMIN minimization
converges better with derivatives provided than without. But it is
definitely worth to give it a shot with amoeba. Its reflection
contraction scheme seems to be a very efficient way of marching toward
convergence.

BTW: I really like your imagesc "clone"! Very useful indeed!

Best,
BP

On Dec 3, 6:36 am, Brian Larsen <balar...@gmail.com> wrote:
>> Hi Brian;
>> Would you please specify this method with a simple example in IDL? I'm
>> interesting in this method but I can't make the head and tail of it.
>
> Sure,
>
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> use the routine.
>
> save this toy example as amoeba_test.pro then just .run amoeba_test
> ;;
> ;   .run amoeba_test
>
> FUNCTION min_me, P
> ;; function is the negative of the dist function
>   RETURN, -(dist(100))[p[0],p[1]]
> ;; probably should have put in some error checking as this will error
> if p<0 or p>99
> END
>
> ; we start at P0
> p0 = [67,45]   ; random guess
> ;; you have to play with scale, it is in some sense the step size that
> ;; the amoeba uses, the smaller the closer to the answer but the
> ;; bigger chance of getting lost and taking forever

> ans = amoeba(1e-5, p0=p0, scale=5, FUNCTION_name='min_me')
> print, ans, -(dist(100))[ans[0], ans[1]]
> ;; lets check the answer
> print, min(-dist(100))
> ;; which should be the right answer
> end
> ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
>
> IDL> .run amoeba_test
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> variables happens in the function, you need to do something like if
> the value to too big or too small then return a large number so the
> amoeba will step away from that.
>
> Cheers,
>
> Brian
>
> ---------- ----------
> Brian Larsen
> Boston University
> Center for Space Physics

Subject: Re: TNMIN limits
Posted by jameskuyper on Tue, 04 Dec 2007 13:22:13 GMT
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biophys wrote:
> Hi, Brain
>
> Thanks for bringing my attention to amoeba. The function I'm
> minimizing contains infinite summation of integral terms containing

> Gamma functions and Bessel functions etc. My TNMIN minimization
> converges better with derivatives provided than without. But it is
> definitely worth to give it a shot with amoeba. Its reflection
> contraction scheme seems to be a very efficient way of marching toward
> convergence.

Efficient is not the right word; when other methods work, amoeba is
almost always slower than those other methods. The great advantage of
amoeba isn't it's efficiency, but its reliability. It will work on
problems that most other methods can't handle.

Subject: Re: TNMIN limits
Posted by Brian Larsen on Tue, 04 Dec 2007 14:56:51 GMT
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> Efficient is not the right word; when other methods work, amoeba is
> almost always slower than those other methods. The great advantage of
> amoeba isn't it's efficiency, but its reliability. It will work on
> problems that most other methods can't handle.

Right indeed.

Another method to try is simulated annealing (aka traveling salesman)
unfortunately I have never coded this up in IDL, I have used it in C
several times to great success. http://en.wikipedia.org/wiki/Simulated_annealing

This method nearly always works but again is slower, but often that
doesn't matter too much, all depended on how many times you have to do
it.

Cheers,

Brian

---------- ----------
Brian Larsen
Boston University
Center for Space Physics

Subject: Re: TNMIN limits
Posted by d.poreh on Tue, 04 Dec 2007 17:15:59 GMT
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On Dec 4, 3:56 pm, Brian Larsen <balar...@gmail.com> wrote:

>> Efficient is not the right word; when other methods work, amoeba is
>> almost always slower than those other methods. The great advantage of
>> amoeba isn't it's efficiency, but its reliability. It will work on
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> Right indeed.
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> doesn't matter too much, all depended on how many times you have to do
> it.
>
> Cheers,
>
> Brian
>
> ----------
> Brian Larsen
> Boston University
> Center for Space Physics

Hi Brian;
Would you please compare GA(genetic algorithm) with amoeba or SA
method? Which on is faster? Which one is reliable? Is in the amoeba
method any divergence problems exist like in GA or SA?
Cheers
Dave