Subject: Re: TOTAL gives totally different result on identical array
Posted by Foldy Lajos on Fri, 08 Jul 2011 18:33:32 GMT
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On Fri, 8 Jul 2011, Liam Gumley wrote:

> On Jul 8, 10:44 am, FÖLDY Lajos <fo...@rmki.kfki.hu> wrote:
>> It will be very slow. But it's IDL, vectorize it!
>
> The pairwise summation algorithm is sometimes recommended as a faster
> solution:
>
> http://en.wikipedia.org/wiki/Pairwise_summation
>
> Here is an IDL implementation (with very little testing!)
>
> FUNCTION PAIRWISE_SUM, X
> compile_opt idl2
> forward_function pairwise_sum
> np = 100
> nx = n_elements(x)
> if (nx le np) then begin
> ;- Naieve summation
> s = total(x, /double)
> endif else begin
> ;- Divide and conquer: recursively sum two halves of the array
> m = floor(nx / 2)
> s = pairwise_sum(x[0:m-1]) + pairwise_sum(x[m:*])
> endelse
> return, s
> END
>

Recursive calls are slow, you can make it much faster:

```
function chunk_sum, x
compile_opt idl2
forward_function chunk_sum
np = 100
nx = n_elements(x)
nchunk = nx / np
sums = dblarr(nchunk+1)
for j=0, nchunk-1 do sums[j] = total(x[j*np:(j+1)*np-1], /double)
left = nx - nchunk * np
if left gt 0 then sums[nchunk] = total(x[nchunk*np, *], /double)
if nchunk gt np then s=chunk_sum(sums) else s=total(sums)
return, s
end
```

```
IDL> test
Kahan sum result
      0.00000
Elapsed time (seconds) =       7.1223309

Pairwise sum result
      0.0000000
Elapsed time (seconds) =       1.1735301

Chunk sum result
      0.0000000
Elapsed time (seconds) =       0.34169912
```

regards,
Lajos
