Subject: zonal means
Posted by Martin Schultz on Mon, 16 Mar 1998 08:00:00 GMT
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Hi everyone,

this is part question, part answer - I just want to make sure there is nothing wrong with this:

Q: How do you compute zonal means from a 3D data cube ?
(example: A(72,46,14) is a data array with longitude, latitude, altitude as dimensions, and I want to compute the averages over longitude for each latitude and altitude)

A: well, you can do it in a loop (buuuuuhh!!)

```
  for j=0,13 do begin
     for i=0,45 do begin
        b(i,j) = total(a(*,i,j)) / 72.
     endfor
  endfor
```

Q: but I hate loops !!

A: hmmm, we could try REBIN or CONGRID. How about that:

```
  c = reform(rebin(a,1,46,14),46,14)
  d = reform(congrid(a,1,46,14),46,14)
```

Q: That looks much more like IDL! But does it work ?

A: (after running a test with random data) Seems like REBIN is just what you are looking for. CONGRID somehow screws it up. BTW: I am sure you want to know the timing of these routines:

```
loop:       1.3769450 seconds
rebin:      0.15734899 seconds
congrid:    0.085584044 seconds
```

These results are obtained by repeating each method 100 times.

Q: But can I be ascertained that REBIN does the job correctly ? And does anyone have an idea why CONGRID screws up ?

Thanks,
Martin.

---------- -------
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Subject: Re: zonal means
Posted by Martin Schultz on Tue, 17 Mar 1998 08:00:00 GMT
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Evilio del Rio wrote:
>
> Martin Schultz wrote:
>> ...
>> Q: How do you compute zonal means from a 3D data cube ?
[...]
> In my opinion you should use the TOTAL function with a second argument:
[...]
> IDL> b = TOTAL(A,1) ; The argument 1 tells TOTAL to sum just in the
> first dim.

Thanks ! Yes, that's what happens if you think you know a function that
you use every day ...

---------- -------
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Subject: Re: zonal means
Posted by Craig Markwardt on Wed, 18 Mar 1998 08:00:00 GMT
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Martin Schultz <mgs@io.harvard.edu> writes:
>
> Q: ... And does anyone have an idea why CONGRID screws up ?

First, CONGRID uses a different form of interpolation compared to REBIN. REBIN will find the simple average of array cells that are collapsed, while CONGRID can be set to perform an interpolation. It's not clear to me that these are the same.

Also, CONGRID() has a subtle bug in its implementation, at least from the point of view of a physicist :-) Essentially, CONGRID attempts to interpolate to the pixel *corners*, not their centers. This becomes a problem at the edges of the array; one "extra" row and column appears at the far edges.

At some point the IDL folks tried to fix CONGRID by adding the MINUS_ONE keyword, which removes those extra pieces. Unfortunately that doesn't solve the problem, if you are trying to be precise, since you lose one row and column. RSI support seems to have confirmed my report of this problem.

The proper solution is to interpolate to the pixel centers. I have a modified version of CONGRID on my IDL web page called CMCONGRID,

http://astrog.physics.wisc.edu/~craigm/idl/idl.html

which does just that. CMCONGRID is a drop in replacement for CONGRID. Use it just like CONGRID, except that you also need to set the keyword HALF_HALF to enable the pixel-center interpolation.

Craig

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Craig B. Markwardt, Ph.D. EMAIL: craigmnet@astrog.physics.wisc.edu
Astrophysics, IDL, Finance, Derivatives | Remove "net" for better response
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Subject: Re: zonal means
Posted by Karsten Rodenacker on Wed, 18 Mar 1998 08:00:00 GMT
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Evilio del Rio schrieb:
> IDL> b = TOTAL(A,1) ; The argument 1 tells TOTAL to sum just in the
> first dim.
> B FLOAT = Array[46, 14]

That is a nice feature of TOTAL.

What about the same for MAX and MIN ?
Actually I make a 'zonal max' using DILATE with appropriate structuring
element, heavily restricted by DILATE only working on byte.

--
Karsten Rodenacker

:-)
GSF - Forschungszentrum
Institut fuer Biomathematik unf Biometry
WWW: http://www.gsf.de/ILIAD/persons/Rodenacker.html

Subject: Re: zonal means
Posted by Karsten Rodenacker on Wed, 18 Mar 1998 08:00:00 GMT
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Excuse for the triplicate message. Something went wrong.
--
Karsten Rodenacker

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Subject: Re: zonal means
Posted by Martin Schultz on Mon, 23 Mar 1998 08:00:00 GMT
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James Tappin wrote:
>
>
> Now for the $64,000 question -- how do you do the same thing for
> medians? What we need here is an index argument to SORT analogous to the
> second argument of TOTAL. Methinks that the only efficient solution is
> currently to write the confounded thing as a CALL_EXTERNAL piece of C
> code.
>
while we are at it: a "dimension" parameter for MIN and MAX would also
be useful. But is it really worth 64k ?

Martin.

--
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> IDL> help,a
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James Tappin,	School of Physics & Astronomy	O__
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Ph: 0121-414-6462. Fax: 0121-414-3722		
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