
Subject: Re: Subscripting multidimensional arrays
Posted by [Chris Lee](#) on Fri, 12 Dec 2003 14:55:16 GMT
[View Forum Message](#) <> [Reply to Message](#)

In article <nwfCb.37807\$SU2.20541@newssvr29.news.prodigy.com>, "Jonathan Greenberg" <greenberg@ucdavis.edu> wrote:

```
> Hi all -- I was hoping to get some help with converting a vector which
> contains the x,y,z position for a value I want to extract from a
> multidimensional array -- I understand that using an array to subscript
> another array requires knowing the linear subscript position. For
> example: a =   0   10   20
>              30   40   50
>              60   70   80
>
>              90  100  110
>              120  130  140
>              150  160  170
> I have a vector which is defined as:
> locationvector=[2,2,2]
> I want to extract the value at that position (e.g. a[2,2,2] = 170), but
> I can't do a:
> a[locationvector] --> I apparently have to convert the locationvector to
> that linear position. How do I do this? Does IDL have a built in
> function that will do this conversion, or is there an easy formula for
> doing this conversion in ANY dimension? Thanks! --j
>
```

```
function element, array, loc_vector
```

```
s=size(array)
d=s[1:s[0]] ;dimensions
e=lonarr(s[0]) ;product of dimensions
e[0]=1L
for i=1L, s[0]-1 do e[i]=e[i-1]*d[i-1]
;e is the number of elements each dimension contains
return, total(loc_vector*e)
```

```
end
```

```
;;test
a=findgen(4,5,6)
;in this example, e=[1,4,20]

b=[2,3,4]
print, a[2,3,4], a[element(a,b)]
```

94.000 94.000

seems to work, there must be a better way though...

Chris.

Subject: Re: Subscripting multidimensional arrays
Posted by [JD Smith](#) on Fri, 12 Dec 2003 16:53:23 GMT
[View Forum Message](#) <> [Reply to Message](#)

On Fri, 12 Dec 2003 07:55:16 -0700, Christopher Lee wrote:

```
> In article <nwfCb.37807$SU2.20541@newssvr29.news.prodigy.com>, "Jonathan
> Greenberg" <greenberg@ucdavis.edu> wrote:
>
>
>> Hi all -- I was hoping to get some help with converting a vector which
>> contains the x,y,z position for a value I want to extract from a
>> multidimensional array -- I understand that using an array to subscript
>> another array requires knowing the linear subscript position. For
>> example: a =   0   10   20
>>               30   40   50
>>               60   70   80
>>
>>               90  100  110
>>               120  130  140
>>               150  160  170
>> I have a vector which is defined as:
>> locationvector=[2,2,2]
>> I want to extract the value at that position (e.g. a[2,2,2] = 170), but
>> I can't do a:
>> a[locationvector] --> I apparently have to convert the locationvector
>> to that linear position. How do I do this? Does IDL have a built in
>> function that will do this conversion, or is there an easy formula for
>> doing this conversion in ANY dimension? Thanks! --j
>>
>>
> function element, array, loc_vector
>
> s=size(array)
> d=s[1:s[0]] ;dimensions
> e=lonarr(s[0]) ;product of dimensions e[0]=1L for i=1L, s[0]-1 do
> e[i]=e[i-1]*d[i-1] ;e is the number of elements each dimension contains
> return, total(loc_vector*e)
>
> end
>
```

> seems to work, there must be a better way though...

PRODUCT works nicely for this:

```
function linear_indices,array,vec_indices
  s=size(array,/DIMENSIONS)
  nd=n_elements(s)
  if nd eq 1 then return,s[0]
  return,long(total([1.,product(s[0:nd-1],/CUMULATIVE)]*vec_in dices))
end
```

to go the other direction, IDL6 offers ARRAY_INDICES. Or you can always just resort to:

```
a[vec[0],vec[1],vec[2]]
```

A take home problem would be to modify this such that NxM input vectors, where N is the number of dimensions of "array", will return a vector of length M containing all the 1-D indices. Hints: REBIN/REFORM and the "dimension" argument to TOTAL.

JD

Subject: Re: Subscripting multidimensional arrays

Posted by [R.G. Stockwell](#) on Fri, 12 Dec 2003 16:57:18 GMT

[View Forum Message](#) <> [Reply to Message](#)

"Jonathan Greenberg" <greenberg@ucdavis.edu> wrote in message news:nwfCb.37807\$SU2.20541@newssvr29.news.prodigy.com...

> Hi all -- I was hoping to get some help with converting a vector which
> contains the x,y,z position for a value I want to extract from a
> multidimensional array -- I understand that using an array to subscript
> another array requires knowing the linear subscript position. For
example:

```
>
> a =   0   10   20
>      30   40   50
>      60   70   80
>
>      90  100  110
>      120  130  140
>      150  160  170
>
```

> I have a vector which is defined as:

```
> locationvector=[2,2,2]
```

>

> I want to extract the value at that position (e.g. a[2,2,2] = 170), but I

> can't do a:
> a[locationvector] --> I apparently have to convert the locationvector to
> that linear position. How do I do this? Does IDL have a built in
function
> that will do this conversion, or is there an easy formula for doing this
> conversion in ANY dimension? Thanks!
>
> --j

The straightforward way is:

```
result=a[locationvector[0],locationvector[1],locationvector[ 2]]
```

This will work if you always have a 3D array (or do you want to be able to
index with an array for an arbitrary size array?)

Also, your location vector should be [2,2,1] in the above example.

Cheers,
bob

Subject: Re: Subscribing multidimensional arrays
Posted by [R.G. Stockwell](#) on Fri, 12 Dec 2003 19:44:10 GMT
[View Forum Message](#) <> [Reply to Message](#)

"R.G. Stockwell" <noemail@please.com> wrote in message
news:5smCb.14\$SO3.23741@news.uswest.net...

>
> This will work if you always have a 3D array (or do you want to be able to
> index with an array for an arbitrary size array?)

ok, just for kicks, for arbitrary array and location vector:
(here I use "loc" as the location vector, i.e. loc = [2,2,1])

```
execode = execute('result =  
a['+string(loc,format='(' + string(n_elements(loc))+'(1,:',',',')') +']')  
print,result
```

Cheers,
bob

Subject: Re: Subscribing multidimensional arrays
Posted by [R.G. Stockwell](#) on Fri, 12 Dec 2003 19:46:59 GMT

"R.G. Stockwell" <noemail@please.com> wrote in message
news:yUoCb.44\$SO3.31192@news.uswest.net...

... that should have been all on one line. DAMN YOU BILL GATES!

Trying again.....

```
execode = execute('result = a['+string(loc,format='(' + string(n_elements(loc))+'(,;,"")) '+']')  
  
print,result
```

-bob

Subject: Re: Subscripting multidimensional arrays
Posted by [Chris Lee](#) on Fri, 12 Dec 2003 21:15:33 GMT
[View Forum Message](#) <> [Reply to Message](#)

JD Smith wrote:

> On Fri, 12 Dec 2003 07:55:16 -0700, Christopher Lee wrote:

<snip>

>

> PRODUCT works nicely for this:

>

> function linear_indices,array,vec_indices

> s=size(array,/DIMENSIONS)

> nd=n_elements(s)

> if nd eq 1 then return,s[0]

;you mean "return ,vec_indices" , yes?

> return,long(total([1.,product(s[0:nd-1],/CUMULATIVE)]*vec_in dices))

> end

PRODUCT doesn't seem to exist on my IDL installations (5.3->5.6 inclusive), is it an IDL 6 thing? I've written my own obviously, but not with CUMULATIVE. Hopefully the IDL 6 licence will work on Monday.

>

> to go the other direction, IDL6 offers ARRAY_INDICES. Or you can always

> just resort to:

>

> a[vec[0],vec[1],vec[2]]
>

Ahem, oops. Apparently I used a cluster bomb to open a can of beans...a switch case statement would take care of the dimensions upto the IDL limit of 8 dimensions, or using IDL's ability to ignore trailing dimensions if they're 0 hack to use 8 dimensions every time.

> A take home problem would be to modify this such that NxM input vectors,
> where N is the number of dimensions of "array", will return a vector of
> length M containing all the 1-D indices. Hints: REBIN/REFORM and the
> "dimension" argument to TOTAL.
>

I got that exercise too, but I thought I'd leave some fun for other people :) plus I always get into a "but what if I wanted the input vector to be MxN" and "what if not enough arguments are supplied, or they're out of bounds" and I remember I have work to do, sometimes.

> JD

Chris.

Subject: Re: Subscripting multidimensional arrays
Posted by [JD Smith](#) on Fri, 12 Dec 2003 21:35:10 GMT
[View Forum Message](#) <> [Reply to Message](#)

On Fri, 12 Dec 2003 14:15:33 -0700, Christopher Lee wrote:

> JD Smith wrote:
>> On Fri, 12 Dec 2003 07:55:16 -0700, Christopher Lee wrote:
> <snip>
>>
>> PRODUCT works nicely for this:
>>
>> function linear_indices,array,vec_indices
>> s=size(array,/DIMENSIONS)
>> nd=n_elements(s)
>> if nd eq 1 then return,s[0]
>
> ;you mean "return ,vec_indices" , yes?

Whoops, yes, sorry:

if nd eq 1 then return, vec_indices[0]

```
>> return, long(total([1., product(s[0:nd-1], /CUMULATIVE)]*vec_indices))
>> end
>
> PRODUCT doesn't seem to exist on my IDL installations (5.3->5.6
> inclusive), is it an IDL 6 thing? I've written my own obviously, but not
> with CUMULATIVE. Hopefully the IDL 6 licence will work on Monday.>
```

Strange, it shipped with IDL5.6.

```
>
>
>> to go the other direction, IDL6 offers ARRAY_INDICES. Or you can
>> always just resort to:
>>
>> a[vec[0],vec[1],vec[2]]
>>
>>
> Ahem, oops. Apparently I used a cluster bomb to open a can of beans...a
> switch case statement would take care of the dimensions upto the IDL
> limit of 8 dimensions, or using IDL's ability to ignore trailing
> dimensions if they're 0 hack to use 8 dimensions every time.
```

Yes, but that would be ugly ;). What if IDL increases the 8-dim limit in the future?

JD

Subject: Re: Subscripting multidimensional arrays

Posted by [Jonathan Greenberg](#) on Sat, 13 Dec 2003 20:19:40 GMT

[View Forum Message](#) <> [Reply to Message](#)

Hey all, JDs nice little function worked great (thanks! i give you credit in the classifier i'm coding right now -- don't worry, its not commercial)-- i did notice there was an 8-d limitation on arrays, but you could get by the by just making your own subscripts, since, as this little process has shown, the arrays are unidimensional in nature anyway... (e.g. there really isn't a functional difference, as I understand it, between:

```
1 2
3 4
```

and

```
1 2 3 4
```

You just need to know the order of subscript indexing...

--j

```
"JD Smith" <jdsmith@as.arizona.edu> wrote in message
news:pan.2003.12.12.16.53.23.571408.24862@as.arizona.edu...
> On Fri, 12 Dec 2003 07:55:16 -0700, Christopher Lee wrote:
>
>> In article <nwfCb.37807$SU2.20541@newssvr29.news.prodigy.com>, "Jonathan
>> Greenberg" <greenberg@ucdavis.edu> wrote:
>>
>>
>>> Hi all -- I was hoping to get some help with converting a vector which
>>> contains the x,y,z position for a value I want to extract from a
>>> multidimensional array -- I understand that using an array to subscript
>>> another array requires knowing the linear subscript position. For
>>> example: a =  0  10  20
>>>      30  40  50
>>>      60  70  80
>>>
>>>      90  100  110
>>>      120  130  140
>>>      150  160  170
>>> I have a vector which is defined as:
>>> locationvector=[2,2,2]
>>> I want to extract the value at that position (e.g. a[2,2,2] = 170), but
>>> I can't do a:
>>> a[locationvector] --> I apparently have to convert the locationvector
>>> to that linear position. How do I do this? Does IDL have a built in
>>> function that will do this conversion, or is there an easy formula for
>>> doing this conversion in ANY dimension? Thanks! --j
>>>
>>>
>> function element, array, loc_vector
>>
>> s=size(array)
>> d=s[1:s[0]] ;dimensions
>> e=lonarr(s[0]) ;product of dimensions e[0]=1L for i=1L, s[0]-1 do
>> e[i]=e[i-1]*d[i-1] ;e is the number of elements each dimension contains
>> return, total(loc_vector*e)
>>
>> end
>>
>> seems to work, there must be a better way though...
>
> PRODUCT works nicely for this:
>
```

```
> function linear_indices,array,vec_indices
>   s=size(array,/DIMENSIONS)
>   nd=n_elements(s)
>   if nd eq 1 then return,s[0]
>   return,long(total([1.,product(s[0:nd-1],/CUMULATIVE)]*vec_in dices))
> end
>
> to go the other direction, IDL6 offers ARRAY_INDICES. Or you can always
> just resort to:
>
> a[vec[0],vec[1],vec[2]]
>
> A take home problem would be to modify this such that NxM input vectors,
> where N is the number of dimensions of "array", will return a vector of
> length M containing all the 1-D indices. Hints: REBIN/REFORM and the
> "dimension" argument to TOTAL.
>
> JD
```
