Subject: How to find second minimum elements in an array in IDL? Posted by Hu on Wed, 14 Jan 2009 15:26:18 GMT

View Forum Message <> Reply to Message

Supposing that there is an array X=[9,2,3,5,1,6,8,4,7], how can I find the first and second minimums (in this array are elements 1 and 2) in this vector?

I use this to find the first minimum (element 1):

index = where(X eq min(X))
minimum_first=X[index]

But, how can i find the elements 2? thanks

Subject: Re: How to find second minimum elements in an array in IDL? Posted by Hu on Wed, 14 Jan 2009 15:45:19 GMT

View Forum Message <> Reply to Message

thank you all, gays

this group is really amazing place for IDL freshman like me. haha.

Subject: Re: How to find second minimum elements in an array in IDL? Posted by Michael Galloy on Wed, 14 Jan 2009 15:53:15 GMT View Forum Message <> Reply to Message

On Jan 14, 8:26 am, Hu < jha...@gmail.com> wrote:

- > Supposing that there is an array X=[9,2,3,5,1,6,8,4,7], how can I find
- > the first and second minimums (in this array are elements 1 and 2) in
- > this vector?

>

> I use this to find the first minimum (element 1):

>

- > index = where(X eq min(X))
- > minimum_first=X[index]

>

- > But, how can i find the elements 2?
- > thanks

For a general approach for finding the n smallest elements of an array (using HISTOGRAM and REVERSE_INDICES!), try:

http://michaelgalloy.com/2006/06/02/finding-the-n-smallest-e lements-in-an-array.html

```
Mike
```

www.michaelgalloy.com Tech-X Corporation

Associate Research Scientist

Subject: Re: How to find second minimum elements in an array in IDL? Posted by Conor on Thu, 15 Jan 2009 17:36:41 GMT

View Forum Message <> Reply to Message

```
On Jan 14, 10:53 am, "mgal...@gmail.com" <mgal...@gmail.com> wrote:
> On Jan 14, 8:26 am, Hu < jha...@gmail.com> wrote:
>> Supposing that there is an array X=[9,2,3,5,1,6,8,4,7], how can I find
>> the first and second minimums (in this array are elements 1 and 2) in
>> this vector?
>> I use this to find the first minimum (element 1):
>> index = where(X eq min(X))
>> minimum first=X[index]
>> But, how can i find the elements 2?
>> thanks
 For a general approach for finding the n smallest elements of an array
  (using HISTOGRAM and REVERSE_INDICES!), try:
>
  http://michaelgalloy.com/2006/06/02/finding-the-n-smallest-e lements-i...
>
> Mike
> --www.michaelgalloy.com
> Tech-X Corporation
> Associate Research Scientist
I was curious, so I checked out your routine Mike. It looks good but
one problem - a for loop! I'm pretty sure you can replace:
  nCandidates = 0L
  for bin = 0L, nBins - 1L do begin
    nCandidates += h[bin]
    if (nCandidates ge n) then break
  endfor
```

with:

```
max(total(h, /cumulative) < n, bin)
```

which should work because max will return the first maximum value. Of course, I was too lazy to see if the max(total()) method is actually faster (since it involves a couple different computations), but oh well, sometimes laziness wins :)

Subject: Re: How to find second minimum elements in an array in IDL? Posted by Michael Galloy on Thu, 15 Jan 2009 22:39:12 GMT

View Forum Message <> Reply to Message

```
On Jan 15, 10:36 am, cmanc...@gmail.com wrote:
> I was curious, so I checked out your routine Mike. It looks good but
> one problem - a for loop! I'm pretty sure you can replace:
    nCandidates = 0L
>
    for bin = 0L, nBins - 1L do begin
>
       nCandidates += h[bin]
>
       if (nCandidates ge n) then break
>
    endfor
>
> with:
    max(total(h, /cumulative) < n, bin)
>
>
> which should work because max will return the first maximum value. Of
> course, I was too lazy to see if the max(total()) method is actually
> faster (since it involves a couple different computations), but oh
> well, sometimes laziness wins :)
```

It turns out that it probably doesn't matter much.

It's not FOR loops per se that are bad, but the execution of many statements. For perfectly uniformly distributed data, the FOR loop above will only loop once -- more times the less uniformly distributed the data, bounded by the number of bins (i.e. number of data elements / number of elements required).

Averages were computed for 500 runs of finding the smallest k=100 elements of an n=1000000 element dataset.

For uniform data:

```
mg_n_smallest(randomu(seed, n), k) vectorized: 0.035663 seconds
```

```
loops: 0.036040 seconds
loops are 1.1% faster

For perverse data:

mg_n_smallest([randomu(seed, k - 1), randomu(seed, n - k + 1) + n / k], 100)

vectorized: 0.279783 seconds
loops: 0.281627 seconds
vectorized is 0.7% faster

Mike
--
www.michaelgalloy.com
Tech-X Corporation
Associate Research Scientist
```

Subject: Re: How to find second minimum elements in an array in IDL? Posted by Conor on Fri, 16 Jan 2009 15:08:51 GMT

View Forum Message <> Reply to Message

```
On Jan 15, 5:39 pm, "mgal...@gmail.com" <mgal...@gmail.com> wrote:
> On Jan 15, 10:36 am, cmanc...@gmail.com wrote:
>
>
>> I was curious, so I checked out your routine Mike. It looks good but
>> one problem - a for loop! I'm pretty sure you can replace:
>
      nCandidates = 0L
>>
      for bin = 0L, nBins - 1L do begin
        nCandidates += h[bin]
>>
        if (nCandidates ge n) then break
>>
      endfor
>>
>> with:
>
      max(total(h,/cumulative) < n, bin)
>>
>> which should work because max will return the first maximum value. Of
>> course, I was too lazy to see if the max(total()) method is actually
>> faster (since it involves a couple different computations), but oh
>> well, sometimes laziness wins :)
> It turns out that it probably doesn't matter much.
```

> It's not FOR loops per se that are bad, but the execution of many > statements. For perfectly uniformly distributed data, the FOR loop > above will only loop once -- more times the less uniformly distributed > the data, bounded by the number of bins (i.e. number of data > elements / number of elements required). > Averages were computed for 500 runs of finding the smallest k=100 elements of an n=1000000 element dataset. > For uniform data: > mg n smallest(randomu(seed, n), k) > > vectorized: 0.035663 seconds > loops: 0.036040 seconds > > loops are 1.1% faster For perverse data: > mg_n_smallest([randomu(seed, k - 1), randomu(seed, n - k + 1) + n / > k], 100) > vectorized: 0.279783 seconds loops: 0.281627 seconds > vectorized is 0.7% faster > > Mike > --www.michaelgalloy.com > Tech-X Corporation > Associate Research Scientist

I didn't really expect much of a difference. I think this is just a personal preference of mine - it looks so much nice when it all fits on one line!

Subject: Re: How to find second minimum elements in an array in IDL? Posted by pgrigis on Fri, 16 Jan 2009 15:48:26 GMT View Forum Message <> Reply to Message

```
cmanc...@gmail.com wrote:
> On Jan 15, 5:39 pm, "mgal...@gmail.com" <mgal...@gmail.com> wrote:
>> On Jan 15, 10:36 am, cmanc...@gmail.com wrote:
>>
>>
>>
>> I was curious, so I checked out your routine Mike. It looks good but
>>> one problem - a for loop! I'm pretty sure you can replace:
```

```
>>
       nCandidates = 0L
>>>
       for bin = 0L, nBins - 1L do begin
>>>
          nCandidates += h[bin]
>>>
          if (nCandidates ge n) then break
>>>
       endfor
>>>
>>
>>> with:
>>
       max(total(h,/cumulative) < n, bin)
>>>
>>
>>> which should work because max will return the first maximum value. Of
>>> course, I was too lazy to see if the max(total()) method is actually
>>> faster (since it involves a couple different computations), but oh
>>> well, sometimes laziness wins :)
>>
>> It turns out that it probably doesn't matter much.
>>
>> It's not FOR loops per se that are bad, but the execution of many
>> statements. For perfectly uniformly distributed data, the FOR loop
>> above will only loop once -- more times the less uniformly distributed
>> the data, bounded by the number of bins (i.e. number of data
>> elements / number of elements required).
>>
>> Averages were computed for 500 runs of finding the smallest k=100
   elements of an n=1000000 element dataset.
>>
>> For uniform data:
>>
    mg_n_smallest(randomu(seed, n), k)
>>
>>
    vectorized: 0.035663 seconds
>>
    loops:
              0.036040 seconds
>>
    loops are 1.1% faster
>>
>>
>> For perverse data:
>>
    mg n smallest([randomu(seed, k - 1), randomu(seed, n - k + 1) + n /
>>
   k], 100)
>>
    vectorized: 0.279783 seconds
>>
    loops: 0.281627 seconds
    vectorized is 0.7% faster
>>
>>
>> Mike
>> --www.michaelgalloy.com
>> Tech-X Corporation
>> Associate Research Scientist
```

>

- > I didn't really expect much of a difference. I think this is just a
- > personal preference of mine it looks so much nice when it all fits
- > on one line!

But we don't want to encourage people writing all of their programs in one line, don't we?

Ciao, Paolo