Subject: Re: Unique combinations from a 1d array
Posted by David Fanning on Wed, 14 Jan 2004 22:38:16 GMT
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Darren writes:

> Does anyone know of a more efficient means to determine the set of all
> unique combinations of 2 from a 1d array? The following is an approach
> that works but for large arrays -say 3000 or more elements it is very
> slow. Part of the problem is due to memory because the number of

> total number of combinations is 4498500. Writing the paired difference
> results to a temporary file helped considerably, but is still far too
> slow. Any ideas would be much appreciated.
>
> Here is the code I have:
>

> n = n_elements(X)
> d = make_array(1, /float)
> for i=0, n-1 do for j=0, n-1 do begin
> if i le j then begin
> d = [d, X[i] - X[j]]
> endif
> endfor
> d = d[1:n-1]

Here is a method that gets the same answer as
your code. (Although I can't convince myself it
does what you *say* it does!)

```
x = RandomU(-3L, 10) * 10
```

Darren's method:

```
% Compiled module: $MAIN$.
IDL> .go
   0.000000     3.39667     1.30986     3.08815     8.37598
   0.751965     8.60027     6.79858     7.55522
```

My method:

```
IDL> Print, ( x[0] - Shift(x,1) )[1:*]
   0.000000     3.39667     1.30986     3.08815     8.37598
   0.751965     8.60027     6.79858     7.55522
```

Cheers,

David
--
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Subject: Re: Unique combinations from a 1d array
Posted by Chris Lee on Thu, 15 Jan 2004 10:00:39 GMT
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In article <MPG.1a6f72c6de3bcc529897a0@news.frii.com>, "David Fanning"
<david@dfanning.com> wrote:

> Darren writes:
>
>> Does anyone know of a more efficient means to determine the set of all
>> unique combinations of 2 from a 1d array? The following is an approach
>> that works but for large arrays -say 3000 or more elements it is very
>> slow. Part of the problem is due to memory because the number of paired
>> comparisons becomes very large ï¿½ i.e. for 3000 elements the total
>> number of combinations is 4498500. Writing the paired difference
>> results to a temporary file helped considerably, but is still far too
>> slow. Any ideas would be much appreciated. Here is the code I have:
>> X = [X1, X2, X3ï¿½..Xn+1]
>> n = n_elements(X)
>> d = make_array(1, /float)
>> for i=0, n-1 do for j=0, n-1 do begin
>> if i le j then begin
>> d = [d, X[i] - X[j]]
>> endif
>> endfor
>> d = d[1:n-1]

Hi,

I'm with David on what your code actually *does*. Especially since I'm
not sure if the last line should be 1:n-1 or 1:* (since n_elements(d) >
n) ? Your 3000 makes 449000 argument says 1:* .

So, incrementally 'improving' your code.

X = [X1,X2,X3,X4,...Xn+1]
n=n_elements(X)
d=make_array(type=size(x,/type), dimension=total(findgen(n)))

```
c=0L
for i=0, n-1 do for j=i+1, n-1 do begin
 d[c]=X[i]-X[j]
 c=c+1
endfor
```

;timing results for an N element array are

| N | yours (s) | mine (s) |
|---|---|---|
| 10 | 0.0033 | 0.0028 |
| 100 | 0.026 | 0.011 |
| 1000 | (too long) | 0.61 |
| 10000 | ***** | 61.0 |

etc.

Of course, under a few thousand elements there are fun matrix
methods, i.e

```
n=n_elements(x)
y=findgen(n)
val=x#replicate(1,n) - x##replicate(1,n)
mask=y#replicate(1,n) - y##replicate(1,n)
;upper diagonal of val contains the unique elements I think.
return, val[where(y gt 0)]
```

;
that one comes in at 0.099s for 1000 points, but there's a health warning
attached to it, its a memory hog at ~(3*N^2) instead of ~(N^2), which doesn't
sound bad but it is :) I couldn't get results for the 10000 point case, but
for 2000 (1.0s c.f 2.4s) and 4000 (1.5s c.f 9.4s) it is faster.

Chris.

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