Subject: Re: Combinatorial
Posted by K. Bowman on Fri, 27 Aug 2004 13:51:29 GMT
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In article <e8ecd642.0408270539.19ddd96a@posting.google.com>,
 andrade_bahia@yahoo.com.br (Adilson) wrote:

> Dear all,
> Would like to know as I make to effect combinations in the IDL I have
> a problem where I want to execute a fixed combination of elements
> contained in a vector. EX: A=[0,1,2,3,4,5] --> six elements I want
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> vector is of 6!/3!*(6-3)! = 20 elements. Example of the vector to be
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> help me would be grateful.
> I subscribe myself with the highest consideration.
> Thanks in advance for your help.
>
> Adilson

Not elegant, but I think this does what you want.

```
IDL> n = 6
IDL> comb = lonarr(3)
IDL> for i = 0, n-1 do for j = i+1, n-1 do for k = j+1, n-1 do comb =
[[comb], [i,j,k]]
IDL> comb = comb[*,1:*]
IDL> print, comb
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       0       1       3
       0       1       4
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       0       2       3
       0       2       4
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       0       3       4
       0       3       5
       0       4       5
       1       2       3
       1       2       4
       1       2       5
       1       3       4
       1       3       5
       1       4       5
       2       3       4
       2       3       5
       2       4       5
```

3 4 5

Ken Bowman

Subject: Re: Combinatorial
Posted by Paul Van Delst[1] on Fri, 27 Aug 2004 14:11:01 GMT
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Adilson wrote:
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> help me would be grateful.
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This is how I do it in Fortran. If IDL doesn't already have something like this built in,
the kludge below should be relatively easy to implement. I think. Does IDL allow recursion?

```
  RECURSIVE SUBROUTINE predictor_combination( initialize,      &  ! In/Output
                                              n_in_set,        &  ! Input
                                              n_in_subset,     &  ! Input
                                              i,               &  ! In/Output
                                              predictor_index, &  ! Output
                                              done             )  ! Output
    ! -- Input
    LOGICAL,                    INTENT( IN OUT ) :: initialize
    INTEGER,                    INTENT( IN )     :: n_in_set     ! == n
    INTEGER,                    INTENT( IN )     :: n_in_subset  ! == k
    INTEGER,                    INTENT( IN OUT ) :: i
    ! -- Output
    INTEGER, DIMENSION( n_in_subset ), INTENT( OUT )    :: predictor_index
    LOGICAL,                    INTENT( OUT )    :: done
    ! -- Local variables
    INTEGER :: j
    INTEGER :: max_index
    INTEGER :: i_minus_1

    IF ( initialize ) THEN
      initialize = .FALSE.
      done = .FALSE.
      i = n_in_subset
```

```
      predictor_index(:) = (/ ( j, j = 1, n_in_subset ) /)
      RETURN
    END IF

    max_index = n_in_set - n_in_subset + i
    IF ( predictor_index( i ) < max_index ) THEN
      predictor_index( i ) = predictor_index( i ) + 1
      IF ( i == 1 .AND. predictor_index( i ) == max_index ) THEN
        done = .TRUE.
      END IF
    ELSE
      i_minus_1 = i - 1
      CALL predictor_combination( initialize,      &  ! Input
                                  n_in_set,        &  ! Input
                                  n_in_subset,     &  ! Input
                                  i_minus_1,       &  ! Input
                                  predictor_index, &  ! Output
                                  done             )  ! Output
      predictor_index( i ) = predictor_index( i - 1 ) + 1
    END IF
  END SUBROUTINE predictor_combination
```

And the documentation:

```
! CALLING SEQUENCE:
!       CALL predictor_combination( initialize,      &  ! In/Output
!                                   n, k,            &  ! Input
!                                   i,               &  ! In/Output
!                                   predictor_index, &  ! Output
!                                   done             )  ! Output
!
! INPUT ARGUMENTS:
!       initialize:       A logical variable used to initialize the predictor
!                         sequence generation. Must be set to .TRUE. on first
!                         call. It is set to .FALSE. after first call. If at
!                         any stage this variable is reset to .TRUE. for
!                         subsequent calls, the predictor sequence generation
!                         starts from scratch.
!                         UNITS:      N/A
!                         TYPE:       LOGICAL
!                         DIMENSION:  Scalar
!                         ATTRIBUTES: INTENT( IN OUT )
!
!       n:                The size of the predictor set. This is the total
!                         number of predictors available for selection.
!                         UNITS:      N/A
```

```
!                   TYPE:      INTEGER
!                   DIMENSION:  Scalar
!                   ATTRIBUTES: INTENT( IN )
!
!     k:             The size of the predictor subset. This is the
!                   number of predictors used in the absorber coefficient
!                   regression. The total number of predictor combinations
!                   generated by this routine is the binomial coefficient
!                   n(C)k. See PROCEDURE below.
!                   UNITS:      N/A
!                   TYPE:      INTEGER
!                   DIMENSION:  Scalar
!                   ATTRIBUTES: INTENT( IN )
!
!     i:            The predictor index subset element to modify. This
!                   value is initialized on the first call to this
!                   routine so the calling program does not have to
!                   (indeed it SHOULDN'T) define or modify this value.
!                   UNITS:      N/A
!                   TYPE:      INTEGER
!                   DIMENSION:  Scalar
!                   ATTRIBUTES: INTENT( IN OUT )
!
! OPTIONAL INPUT ARGUMENTS:
!     None.
!
! OUTPUT ARGUMENTS:
!     predictor_index:  The index list for a predictor combination sequence.
!                   This array is updated each call with the next
!                   possible combination of predictor indices.
!                   UNITS:      N/A
!                   TYPE:      INTEGER
!                   DIMENSION:  Rank-1, DIMENSION( k )
!                   ATTRIBUTES: INTENT( OUT )
!
!     done:          A logical variable used to indicate to the CALLING
!                   routine that all of the possible combinatorial
!                   sequences have been generated.  This value is
!                   initialized to .FALSE. on the first call to this
!                   routine and set to .TRUE. when all predictor index
!                   sequences have been exhausted.
!                   UNITS:      N/A
!                   TYPE:      LOGICAL
!                   DIMENSION:  Scalar
!                   ATTRIBUTES: INTENT( OUT )
```

A simple test program below shows how it is called in practice. Each trip through the DO

loop spits out the next combination based on on the "n" and "k" inputs.

```
PROGRAM predictor_combination_test
  ! $Id: predictor_combination_test.f90,v 1.1 2001/11/30 18:07:27 paulv Exp $

  ! -- Use the required module
  USE coefficient_generation

  ! -- Type declarations
  LOGICAL :: initialise, done
  INTEGER :: n, k, i, j
  INTEGER, DIMENSION(:), ALLOCATABLE :: p

  ! -- Get some n, k values
  WRITE( *, '( /5x, "Enter values for n and k : " )', &
           ADVANCE = 'NO' )
  READ( *, * ) n, k

  ! -- Allocate the predictor index array
  ALLOCATE( p(k) )

  ! -- Initialisation
  j = 0
  initialise = .TRUE.

  ! -- Output the combinations
  DO
    CALL predictor_combination( initialise, n, k, i, p, done )
    PRINT *, p
    j = j + 1
    IF (done) EXIT
  END DO
  WRITE( *, '( 5x, "Total combinations = ", i5, / )' ) j

  ! -- Deallocate the predictor index array
  DEALLOCATE( p )

END PROGRAM predictor_combination_test
```

Subject: Re: Combinatorial
Posted by Paul Van Delst[1] on Fri, 27 Aug 2004 14:12:04 GMT
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Kenneth Bowman wrote:
> In article <e8ecd642.0408270539.19ddd96a@posting.google.com>,
> andrade_bahia@yahoo.com.br (Adilson) wrote:

>
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>   2   4   5
>   3   4   5

>
> Ken Bowman

Subject: Re: Combinatorial
Posted by David Fanning on Fri, 27 Aug 2004 14:16:04 GMT
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Paul Van Delst writes:

> Looks pretty bloody elegant to me after the dreck I posted! :o)

I'll say! IDL sales are up by a factor of 5 today, is what
I hear. :-)

Cheers,

David
--
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
Coyote's Guide to IDL Programming: http://www.dfanning.com/

Subject: Re: Combinatorial
Posted by andrade_bahia on Mon, 30 Aug 2004 14:58:26 GMT
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Dear Bowman,
I Would like to thank the orientation.
But if the combination will be of more attributes, or either, 4x4,
5x5?? How I could make?
Thanks in advance for your help.

Adilson Andrade

Kenneth Bowman <k-bowman@null.tamu.edu> wrote in message
news:<k-bowman-20D54B.08512927082004@news.tamu.edu>...
> In article <e8ecd642.0408270539.19ddd96a@posting.google.com>,
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> 1 4 5
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> 2 3 5
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>
> Ken Bowman

Subject: Re: Combinatorial
Posted by K. Bowman on Mon, 30 Aug 2004 17:58:00 GMT
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In article <e8ecd642.0408300658.5304ce28@posting.google.com>,
andrade_bahia@yahoo.com.br (Adilson) wrote:

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> Adilson Andrade

Same idea. To choose m items, you will need to nest m FOR loops. I'm sure other algorithms could be devised that have only a single loop.

Ken Bowman

Subject: Re: Combinatorial
Posted by andrade_bahia on Tue, 31 Aug 2004 13:02:07 GMT
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Dear Bowman
I obtained to make the combinations without needing to use recursive form.
Thanks in advance for your help.

```
 ;************************************************************ *************
FUNCTION Combination,n,k
c=lindgen(k)
cmax=N-reverse(lindgen(k))-1
i=k-1
comb=c
while i GE 0 do begin
c[i]=c[i]+1
 if c[i] GT cmax[i] then begin
    i=max(where(c lt cmax))
    if i eq -1 then break
  c[i]=c[i]+1
   for j=i+1, k-1 do c[j]=c[j-1]+1
i=k-1
 endif
 comb= [[comb],[c]]
;stop
endwhile
return, com
END
```

Adilson

Kenneth Bowman <k-bowman@null.tamu.edu> wrote in message

news:<k-bowman-A330BB.12580030082004@news.tamu.edu>...
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Posted by andrade_bahia on Tue, 31 Aug 2004 13:04:39 GMT
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c=lindgen(k)
cmax=N-reverse(lindgen(k))-1
i=k-1
comb=c
while i GE 0 do begin
c[i]=c[i]+1
 if c[i] GT cmax[i] then begin
    i=max(where(c lt cmax))
    if i eq -1 then break
  c[i]=c[i]+1
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```

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