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Subject: \*\*\* HERE IT IS: arrex, version 1.0 \*\*\*  
Posted by [Martin Schultz](#) on Thu, 20 May 1999 07:00:00 GMT  
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Hi folks,

couldn't let go .. Please find a first version of ARREX.PRO attached.  
I encourage you to do a lot of testing and tell me what doesn't work as you expect. This version is limited to a maximum of 4 dimensions, but once it is stable, it is very easy to extend it. Also, the internal function `arrex_ComputeInd` contains practically everything one needs to write an ARREXI function to return the indices instead of the values. I included some debug output for now to make it clear that this is a test version. Haven't done any timing tests, but a test with

```
a = findgen(1000,100,100)
print,arrex(a,-1,-1,[100,10,10])
```

runs reasonably fast.

Enjoy!  
Martin.

```
|||||||\\-----//|
```

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```
;----- --
; $Id$
;+
; NAME:
;   ARREX (function)
;
; PURPOSE:
;   This function extracts a multi-dimensional subset
;   of an array. For each dimension the start index,
;   end index, and stride can be specified - default values
;   are 0 (i.e. first start index), "all" (i.e. last end
;   index), and 1 (i.e. every element). A negative stride
;   causes reversion of the respective array dimension.
;
; CATEGORY:
;   Math
;
; CALLING SEQUENCE:
;   Result = ARREX(Array [, Starti [,Endi [, Stride ]]] [,/Reform])
;
; INPUTS:
```

```

; ARRAY -> The parent array from which the extraction shall be made.
; Currently up to 4 dimensions are supported.
;
;
; STARTI -> An array with starting indices. Each element of STARTI
; corresponds to one dimension of ARRAY. If STARTI has less
; elements than ARRAY dimensions, the remainder is assumed 0.
;
;
; ENDI -> An array with ending indices. Each element of ENDI
; corresponds to one dimension of ARRAY. If ENDI has less
; elements than ARRAY dimensions, the remainder is set to the
; maximum possible value for that dimension.
;
;
; STRIDE -> An array with stride values. A stride of 1 (default)
; signifies extraction of every element, 2 returns every
; second element for that dimension, etc. Negative values
; cause the respective dimension to be reversed.
; Each value of STRIDE corresponds to one dimension of ARRAY.
; If STRIDE has less elements than ARRAY dimensions, the
; remainder is assumed 1.
;
; KEYWORD PARAMETERS:
; /REFORM -> Set this keyword to eliminate unnecessary dimensions
; in the result.
;
;
; OUTPUTS:
; A subset of the original array. This will have the same
; dimensionality as ARRAY unless the REFORM keyword is set.
;
;
; SUBROUTINES:
; Function arrex_ComputeInd
;
;
; REQUIREMENTS:
; Uses the reverse function from the IDL library
;
;
; NOTES:
; Created after discussion in newsgroup idl-pvwave.
;
; This version contains some debug output.
;
;
; EXAMPLE:
; A = indgen(10,10)
; print,arrex(A,[2,1],-1,[2,4])
; ; yields 12 14 16 18
; ; 52 54 56 58
; ; 92 94 96 98
; print,arrex(A,[10,1],[1,10],[5,5])
; ; yields 19 15
; ; 69 65

```

```

; ; note that stride for dimension 1 is adjusted automatically.
;
;
; MODIFICATION HISTORY:
; mgs, 20 May 1999: VERSION 1.00
; - with a lot of input from L. Gumley, S. Vidar, and others
;
;
;-
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; please contact the author.
; Bugs and comments should be directed to mgs@io.harvard.edu
; with subject "IDL routine arrex"
;-----

```

```

function arrex_ComputeInd,DStart,DEnd,DStride

; get number of elements to be returned for current dimension
; Integer division!
NEI = ( ( DEnd>DStart) - (DStart<DEnd) ) / DStride ) + 1

; Compute index array
if (DStart le DEnd) then $
  Ind = lindgen(NEI)*DStride + DStart $
else $
  Ind = DStart - lindgen(NEI)*DStride

  return,Ind
end

```

```

function arrex,Array,Starti,Endi,Stride,Reform=DoReform

; return quietly if array is undefined or a scalar
if (n_elements(Array) eq 0) then $
  return,0L
if (n_elements(Array) eq 1) then $
  return,Array

; get array dimensions
NDims = size( Array, /N_Dimensions )
Dims = size( Array, /Dimensions )

```

```

; ### DEBUG
help,Array

; check parameters and set defaults
; if parameter is not present use
; 0 as default for Starti
; Dim[i] as default for Endi
; 1 as default for Stride
; if parameter has less dimensions than Array fill
; remainder with defaults
; if Starti or Endi are negative (-1) use defaults
; if Starti > Endi, Stride must be < 0. This reverses
; the respective dimension.

DStart = lonarr(NDims) ; array with 0
DEnd = Dims - 1L ; last elements
DStride = lonarr(NDims) + 1L ; every element

if (n_elements(Starti) gt 0) then begin
  if (n_elements(Starti) gt NDims) then begin
    message,'START contains more numbers than ARRAY dimensions!', $
      /Continue
    return, Array
  endif
  ; since default is 0 anyway, only copy values in Starti that
  ; are greater zero
  ind = where(Starti gt 0L)
  if (ind[0] ge 0) then $
    DStart[ind] = ( Starti[ind] < Dims[ind] )
  endif
; ### DEBUG
print,'Start indices: ',fix(DStart)

if (n_elements(Endi) gt 0) then begin
  if (n_elements(Endi) gt NDims) then begin
    message,'END contains more numbers than ARRAY dimensions!', $
      /Continue
    return, Array
  endif
  ; Only copy values in Endi that are at least zero
  ind = where(Endi ge 0L)
  if (ind[0] ge 0) then $
    DEnd[ind] = ( Endi[ind] < Dims[ind] )
  endif
; ### DEBUG
print,'End indices: ',fix(DEnd)

```

```

if (n_elements(Stride) gt 0) then begin
  if (n_elements(Stride) gt NDims) then begin
    message,'STRIDE contains more numbers than ARRAY dimensions!', $
      /Continue
    return, Array
  endif
  ; Only copy values in Stride that are not zero
  ind = where(Stride ne 0L)
  if (ind[0] ge 0) then $
    DStride[ind] = Stride[ind]
  ; Check if Starti, Endi, and Stride are consistent
  ; Starti < Endi with Stride < 0 leads to "collapse" of array
  for i=0,NDims-1 do begin
    if (DStart[i] lt DEnd[i] AND DStride[i] lt 0) then begin
      message,'Invalid parameters for dimension '+strtrim(i+1,2) + $
        '! Adjusting STRIDE.',/Continue
      DStride[i] = -DStride[i]
    endif
    if (DStart[i] gt DEnd[i] AND DStride[i] gt 0) then begin
      message,'Invalid parameters for dimension '+strtrim(i+1,2) + $
        '! Adjusting STRIDE.',/Continue
      DStride[i] = -DStride[i]
    endif
  endfor
endif else begin ; change default to include negative strides
  ; where ENDI lt STARTI
  ind = where(DEnd lt DStart)
  if (ind[0] ge 0) then $
    DStride[ind] = -1L
endelse

; ### DEBUG
print,'Stride: ',fix(DStride)

; For extraction, change Stride to all positive
; Save info which dimensions shall be reversed (just for debugging)
NeedReverse = intarr(NDims)
ind = where(DStride lt 0)
if (ind[0] ge 0) then $
  NeedReverse[ind] = 1

DStride = abs(DStride)

; ***** actual extraction here *****
Result = Array

```

case (NDims) of

```
1 : begin
    i = 0
    Ind = arrex_ComputeInd(DStart[i],DEnd[i],DStride[i])
    Result = temporary(Result[ind])
endif
```

```
2 : begin
    i = 0
    Ind = arrex_ComputeInd(DStart[i],DEnd[i],DStride[i])
    Result = temporary(Result[ind,*])
    i = 1
    Ind = arrex_ComputeInd(DStart[i],DEnd[i],DStride[i])
    Result = temporary(Result[*],ind])
endif
```

```
3 : begin
    i = 0
    Ind = arrex_ComputeInd(DStart[i],DEnd[i],DStride[i])
    Result = temporary(Result[ind,*,*])
    i = 1
    Ind = arrex_ComputeInd(DStart[i],DEnd[i],DStride[i])
    Result = temporary(Result[*],ind,*])
    i = 2
    Ind = arrex_ComputeInd(DStart[i],DEnd[i],DStride[i])
    Result = temporary(Result[*,*],ind])
endif
```

```
4 : begin
    i = 0
    Ind = arrex_ComputeInd(DStart[i],DEnd[i],DStride[i])
    Result = temporary(Result[ind,*,*,*])
    i = 1
    Ind = arrex_ComputeInd(DStart[i],DEnd[i],DStride[i])
    Result = temporary(Result[*],ind,*,*])
    i = 2
    Ind = arrex_ComputeInd(DStart[i],DEnd[i],DStride[i])
    Result = temporary(Result[*,*],ind,*])
    i = 3
    Ind = arrex_ComputeInd(DStart[i],DEnd[i],DStride[i])
    Result = temporary(Result[*,*,*],ind])
endif
```

```
else : message,'TEST version. Not more than 4 dimensions allowed.', $
    /Continue
```

endcase

```
; Apply reform if requested  
if (keyword_set(DoReform)) then $  
    Result = reform(temporary(Result))
```

```
return,Result
```

```
end
```

## File Attachments

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1) [arrex.pro](#), downloaded 76 times

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