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Subject: Re: Scaling of axes 1:1 in IDL  
Posted by [thompson](#) on Tue, 10 Oct 1995 07:00:00 GMT  
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heide@immr.tu-clausthal.de (Gerhard Heide) writes:

> Hi,

> who can I scaling the axes in a contour plot 1:1?

> The tick interval is perhaps 1m of the x and y axes, but the printed plot  
> isn't it equal intervals.

> I can scale the contour plot with postscript options XSIZE and YSIZE, but  
> the plot is depended from the axes label and title!

This routine may do what you want to do.

Bill Thompson

```
=====
=====
PRO SETSCALE,P1,P2,P3,P4,NOBORDER=NOBORDER,NOADJUST=NOADJUST
;+
; Project   : SOHO - CDS
;
; Name      :
; SETSCALE
; Purpose   :
; Sets plot scale so it is the same in X and Y directions.
; Explanation :
; The data limits in the X and Y directions (plus 5%) are calculated and
; compared against the the physical size of the plotting area in device
; coordinates. Whichever scale is larger is then used for both axes, and
; the plot limits are set to center the data in both directions. The
; parameters !X.STYLE and !Y.STYLE are then set to 1 for exact spacing.
; Use       :
; SETSCALE  - Resets to previous state.
; SETSCALE, ARRAY  - Calculates scale for CONTOUR.
; SETSCALE, XARRAY, YARRAY  - Calculates scale from arrays.
; SETSCALE, XMIN, XMAX, YMIN, YMAX - Calculates scale from limits.
; Inputs    :
; None required. Calling SETSCALE without any parameters resets to the
; default behavior.
; Opt. Inputs :
; ARRAY     - Two dimensional array to be used in a simple
;   contour plot. The minima are set to zero,
;   and the maxima are set to one less than the
;   dimensions of the array.
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; XARRAY, YARRAY - Arrays from which the minimum and maximum
;   values are calculated.
; XMIN, XMAX, YMIN, YMAX - The limits in the X and Y directions from
;   which the scale is calculated. The actual
;   X and Y ranges must include these values.
; Outputs   :
; None.
; Opt. Outputs:
; None.
; Keywords  :
; NOBORDER = If set, then the 5% border is not applied.
; NOADJUST = If set, then the edges of the plot (!P.POSITION) are
;   not modified.
; Calls    :
; GET_VIEWPORT
; Common   :
; SETSCALE = Keeps track of the system variables changed by this routine.
; Restrictions:
; Unpredictable results may occur if SETSCALE is in effect when WINDOW,
; WSET or SET_PLOT are called. It is recommended that SETSCALE be called
; without parameters to reset to the ordinary behavior before the
; graphics device or window is changed.
;
; In general, the SERTS graphics devices routines use the special system
; variables !BCOLOR and !ASPECT. These system variables are defined in
; the procedure DEVICELIB. It is suggested that the command DEVICELIB be
; placed in the user's IDL_STARTUP file.
;
; Side effects:
; The system variables !X.STYLE, !Y.STYLE, !X.S, !Y.S, !X.RANGE (!XMIN
; and !XMAX) and !Y.RANGE (!YMIN and !YMAX) are modified.
;
; Unless NOADJUST is set, the edges of the plot (!P.POSITION) are
; adjusted to fit the data. Then, when SETSCALE is called without any
; parameters, these parameters are returned to their original settings.
;
; System variables may be changed even if the routine exits with an error
; message.
;
; If SETSCALE is called without any parameters, then the modified system
; variables are restored to their original values. Additional graphics
; functions such as OPLOT will still be possible.
;
; Category  :
; Utilities, Devices.
; Prev. Hist. :
; William Thompson, Feb. 1991.
; William Thompson, Oct. 1991, added !ASPECT system variable.

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; William Thompson, May 1992, added common block and changing viewport.
; William Thompson, Nov. 1992, changed structure of common block, and
; removed support for changing viewport.
; William Thompson, Nov. 1992, changed to use GET_VIEWPORT instead of
; INIT_SC1_SC4, and to restore original !P.POSITION when called
; with no parameters.
; William Thompson, December 1992, changed common block to keep better
; track of the state of the system variables.
; Written   :
; William Thompson, GSFC, February 1991.
; Modified  :
; Version 1, William Thompson, 27 April 1993.
; Incorporated into CDS library.
; Version   :
; Version 1, 27 April 1993.
;-
;
ON_ERROR,2
COMMON SETSCALE,POS_SET,SCL_SET,XSTYLE,YSTYLE,XRANGE,YRANGE,POSITIO N
;
; Check to see if the common block variables have been initialized.
;
IF N_ELEMENTS(POS_SET) EQ 0 THEN BEGIN
  POS_SET = 0
  SCL_SET = 0
  XSTYLE = !X.STYLE
  YSTYLE = !Y.STYLE
  XRANGE = !X.RANGE
  YRANGE = !Y.RANGE
  POSITION = !P.POSITION
ENDIF
;
; Check to see if the screen coordinates have been stored.  If they have
; already been set, then reset them to their original settings so that the
; routine starts with a clean plate.
;
IF POS_SET EQ 0 THEN BEGIN
  IF SCL_SET EQ 0 THEN BEGIN
    XSTYLE = !X.STYLE
    YSTYLE = !Y.STYLE
    XRANGE = !X.RANGE
    YRANGE = !Y.RANGE
  ENDIF
  POSITION = !P.POSITION
END ELSE IF NOT KEYWORD_SET(NOADJUST) THEN BEGIN
  !P.POSITION = POSITION
  GET_VIEWPORT,SC1,SC2,SC3,SC4
  !X.CRANGE = ([SC1,SC2]/!D.X_SIZE - !X.S(0)) / !X.S(1)

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!Y.CRANGE = ([SC3,SC4]/!D.Y_SIZE - !Y.S(0)) / !Y.S(1)
POS_SET = 0
ENDIF
;
; If no parameters were passed, then reset the range parameters and return.
;
IF N_PARAMS() EQ 0 THEN BEGIN
IF SCL_SET NE 0 THEN BEGIN
!X.STYLE = XSTYLE
!Y.STYLE = YSTYLE
!X.RANGE = XRANGE
!Y.RANGE = YRANGE
SCL_SET = 0
ENDIF
RETURN
;
; If only one parameter was passed, then set the scale as it would be used for
; CONTOUR.
;
END ELSE IF N_PARAMS() EQ 1 THEN BEGIN
SZ = SIZE(P1)
IF SZ(0) NE 2 THEN BEGIN
PRINT, '*** ARRAY must be two dimensional, ' + $
'routine SETSCALE.'
RETURN
ENDIF
XMIN = 0 & XMAX = SZ(1) - 1
YMIN = 0 & YMAX = SZ(2) - 1
;
; If two parameters are passed, then set the scale for PLOT,X,Y
;
END ELSE IF N_PARAMS() EQ 2 THEN BEGIN
XMIN = MIN(P1, MAX=XMAX)
YMIN = MIN(P2, MAX=YMAX)
;
; If four parameters are passed, then the ranges have been passed directly.
;
END ELSE IF N_PARAMS() EQ 4 THEN BEGIN
XMIN = P1 & XMAX = P2
YMIN = P3 & YMAX = P4
;
; Otherwise, print an error message.
;
END ELSE BEGIN
PRINT, '*** SETSCALE must be called with 0-4 parameters:'
PRINT, '    SETSCALE'
PRINT, '    SETSCALE, ARRAY'
PRINT, '    SETSCALE, XARRAY, YARRAY'

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PRINT, '    SETSCALE, XMIN, XMAX, YMIN, YMAX'
RETURN
ENDELSE
;
; Check to see if the screen coordinates have been initialized.
;
GET_VIEWPORT, SC1, SC2, SC3, SC4
;
; Calculate the plot scale.
;
XSCALE = ABS(XMAX - XMIN) / (SC2 - SC1) * !ASPECT
YSCALE = ABS(YMAX - YMIN) / (SC4 - SC3)
IF NOT KEYWORD_SET(NO BORDER) THEN BEGIN
  XSCALE = 1.05 * XSCALE
  YSCALE = 1.05 * YSCALE
ENDIF
SCALE = XSCALE > YSCALE
IF SCALE LE 0 THEN BEGIN
  PRINT, '*** Unable to calculate the plot scale, routine SETSCALE.'
  RETURN
ENDIF
;
; Calculate the new screen coordinates.
;
IF NOT KEYWORD_SET(NO ADJUST) THEN BEGIN
  XAVG = (SC1+SC2) / 2.
  YAVG = (SC3+SC4) / 2.
  XDELTA = ABS(XMAX - XMIN) / SCALE * !ASPECT
  YDELTA = ABS(YMAX - YMIN) / SCALE
  IF NOT KEYWORD_SET(NO BORDER) THEN BEGIN
    XDELTA = 1.05 * XDELTA
    YDELTA = 1.05 * YDELTA
  ENDIF
  SC1 = XAVG - XDELTA / 2. & SC2 = XAVG + XDELTA / 2.
  SC3 = YAVG - YDELTA / 2. & SC4 = YAVG + YDELTA / 2.
  !SC1 = SC1 & !SC2 = SC2
  !SC3 = SC3 & !SC4 = SC4
  POS_SET = 1
ENDIF
;
; Calculate the edges of the plot.
;
XAVG = (XMIN+XMAX) / 2.
YAVG = (YMIN+YMAX) / 2.
XDELTA = SCALE * (SC2-SC1) / (2*!ASPECT)
YDELTA = SCALE * (SC4-SC3) / 2.
!X.RANGE = [XAVG - XDELTA, XAVG + XDELTA]
!Y.RANGE = [YAVG - YDELTA, YAVG + YDELTA]

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SCL_SET = 1
;
; Check to see if the data should be plotted in reverse order.
;
IF XMIN GT XMAX THEN !X.RANGE = REVERSE(!X.RANGE)
IF YMIN GT YMAX THEN !Y.RANGE = REVERSE(!Y.RANGE)
;
; Set the style parameters to force the data to be plotted with the exact
; edges calculated.
;
!X.STYLE = !X.STYLE OR 1
!Y.STYLE = !Y.STYLE OR 1
;
; Calculate the scaling parameters !X.S and !Y.S
;
!X.S(1) = (SC2 - SC1) / (!X.RANGE(1) - !X.RANGE(0)) / !D.X_SIZE
!Y.S(1) = (SC4 - SC3) / (!Y.RANGE(1) - !Y.RANGE(0)) / !D.Y_SIZE
!X.S(0) = !X.WINDOW(0) - !X.RANGE(0)*!X.S(1)
!Y.S(0) = !Y.WINDOW(0) - !Y.RANGE(0)*!Y.S(1)
;
RETURN
END
=====
=====
PRO GET_VIEWPORT, SC1, SC2, SC3, SC4
;+
; Project   : SOHO - CDS
;
; Name      :
; GET_VIEWPORT
; Purpose   :
; Gets current viewport values, in device coordinates.
; Explanation :
; Gets the current values of the viewport, in the form of the
; old-fashioned variables !SC1, !SC2, !SC3, and !SC4. This supports
; those routines that were originally developed for IDL version 1.
;
; The routine calculates the system variables by generating a dummy plot
; without actually drawing to the screen.
;
; Use       :
; GET_VIEWPORT, SC1, SC2, SC3, SC4
; Inputs    :
; None.
; Opt. Inputs :
; None.
; Outputs   :
; SC1, SC2, SC3, SC4 are the device coordinates of the viewport.

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; Opt. Outputs:
; None.
; Keywords   :
; None.
; Calls     :
; None.
; Common    :
; None.
; Restrictions:
; In general, the SERTS graphics devices routines use the special system
; variables !BCOLOR and !ASPECT. These system variables are defined in
; the procedure DEVICELIB. It is suggested that the command DEVICELIB be
; placed in the user's IDL_STARTUP file.
;
; Side effects:
; None.
; Category   :
; Utilities, Devices.
; Prev. Hist. :
; William Thompson, November 1992.
; William Thompson, November 1992, modified to get parameters by
; generating a dummy plot rather than calculating directly, so as
; to be compatible with !P.MULTI.
; William Thompson, December 1992, corrected bug where certain system
; variables were being changed by this routine.
; Written    :
; William Thompson, GSFC, November 1992.
; Modified   :
; Version 1, William Thompson, GSFC, 27 April 1993.
; Incorporated into CDS library.
; Version 2, William Thompson, GSFC, 12 January 1994.
; Modified to avoid problems that may arise when !X.STYLE or
; !Y.STYLE is not zero.
; Version    :
; Version 2, 12 January 1994.
;-
;
; ON_ERROR, 2
;
; Check the number of parameters.
;
; IF N_PARAMS() NE 4 THEN MESSAGE, $
; 'Syntax: GET_VIEWPORT, SC1, SC2, SC3, SC4'
;
; Save the current settings of the system variables.
;
; P = !P & X = !X & Y = !Y & Z = !Z
;

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; Do a dummy plot.
;
PLOT,[0,0],[1,1],/NODATA,XSTYLE=4,YSTYLE=4,TITLE=",/NOERASE
;
; Get the values of !SC1, etc.
;
SC1 = !SC1 & SC2 = !SC2 & SC3 = !SC3 & SC4 = !SC4
;
; Restore the system variables.
;
!P = P & !X = X & !Y = Y & !Z = Z
;
RETURN
END
```

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