Subject: New in 5.5: SFit, /Irregular, /Max_Degree
Posted by Dick Jackson on Tue, 16 Apr 2002 02:47:10 GMT
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Hi all,

I just realized today that a couple of dandy additions to SFit.pro came in with IDL 5.5 (due to some well-placed nagging to a receptive RSI), but this was not documented in the What's New PDF. What you get are the ability to:

- fit a set of arbitrary XYZ values (rather than Z values for a regular 2D XY grid)
- requesting a 'regression fitting' polynomial (rather than a complete polynomial of degree n in X and Y)

I had hacked up something called SFitXYZ some time back to do some of this (which can be ignored now), so I was happy to see these added into SFit. For reference, here is the header for the new version.

```
function sfit, z, degree, KX=kx, IRREGULAR=irreg_p, MAX_DEGREE=max_p
;+
; NAME:
;  SFIT
;
; PURPOSE:
;  This function determines a polynomial fit to a surface sampled
;    over a regular or irregular grid.
;
; CATEGORY:
;  Curve and surface fitting.
;
; CALLING SEQUENCE:
;  Result = SFIT(Data, Degree)    ;Regular input grid
;  Result = SFIT(Data, Degree, /IRREGULAR)  ;Irregular input grid
;
; INPUTS:
;  Data: The array of data to fit. If IRREGULAR
;  is not set, the data are assumed to be sampled over a regular 2D
;  grid, and should be in an Ncolumns by Nrows array.  In this case, the
;  column and row subscripts implicitly contain the X and Y
;  location of the point.  The sizes of the dimensions may be unequal.
;  If IRREGULAR is set, Data is a [3,n] array containing the X,
;  Y, and Z location of each point sampled on the surface.
;
;  Degree:  The maximum degree of fit (in one dimension).
;
; KEYWORDS:
;  IRREGULAR: If set, Data is [3,n] array, containing the X, Y,
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;    and Z locations of n points sampled on the surface.  See
;    description above.
;  MAX_DEGREE: If set, the Degree parameter represents the
;       maximum degree of the fitting polynomial of all dimensions
;       combined, rather than the maximum degree of the polynomial
;       in a single variable. For example, if Degree is 2, and
;       MAX_DEGREE is not set, then the terms returned will be
;       [[K, y, y^2], [x, xy, xy^2], [x^2, x^2 y, x^2 y^2]].
;       If MAX_DEGREE is set, the terms returned will be in a
;       vector, [K, y, y^2, x, xy, x^2], in which no term has a
;       power higher than two in X and Y combined, and the powers
;       of Y vary the fastest.
;
;
; OUTPUT:
;  This function returns the fitted array.  If IRREGULAR is not
;  set, the dimensions of the result are the same as the
;  dimensions of the Data input parameter, and contain the
;  calculated fit at the grid points.  If IRREGULAR is set, the
;  result contains n points, and contains the value of the
;  fitting polynomial at the sample points.
;
; OUTPUT KEYWORDS:
;  Kx:   The array of coefficients for a polynomial function
;     of x and y to fit data. If MAX_DEGREE is not set, this
;     parameter is returned as a (Degree+1) by (Degree+1)
;     element array.  If MAX_DEGREE is set, this parameter
;     is returned as a (Degree+1) * (Degree+2)/2 element
;     vector.
;
; PROCEDURE:
;  Fit a 2D array Z as a polynomial function of x and y.
;  The function fitted is:
;         F(x,y) = Sum over i and j of kx[j,i] * x^i * y^j
;  where kx is returned as a keyword.  If the keyword MAX_DEGREE
;  is set, kx is a vector, and the total of the X and Y powers will
;  not exceed DEGREE, with the Y powers varying the fastest.
;
; MODIFICATION HISTORY:
;  July, 1993, DMS      Initial creation
;  July, 2001     Added MAX_DEGREE and IRREGULAR keywords.

Cheers,
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-Dick

Dick Jackson                 /          dick@d-jackson.com
D-Jackson Software Consulting /       http://www.d-jackson.com
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Calgary, Alberta, Canada / +1-403-242-7398 / Fax: 241-7392