Subject: Re: Calculating Error Estimates
Posted by Wayne Landsman on Tue, 14 Jul 1998 07:00:00 GMT
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Before giving my answer David Fanning's question about estimating errors from
CURVEFIT, I first want to post a related complaint about the procedure SVDFIT. SVDFIT has an output parameter SIGMA which according to the documentation gives the "1-sigma error estimates of the returned parameters." What the documentation doesn't say is that unless you supply
values in the optional WEIGHTS input keyword, then the values returned by SIGMA
are likely to be complete nonsense.

In order to compute the uncertainties in the derived parameters, SVDFIT needs to
know the uncertainties in the individual data points. If the user does not
supply these, then SVDFIT assume that the uncertainties are all equal (which is
reasonable), and that they are all equal to 1 unit (which is likely to be very
unreasonable).

What one should do -- and what David F. should do for his example -- is to
estimate the uncertainties by comparing the data with the best fit. This is
done correctly by the procedure LINFIT.

SIGMA = SQRT((TOTAL ((Y - YFIT)^2) / (NPTS - NPARAMS)))

where NPTS and NPARAMS are respectively the number of data points and number of
parameters used in the fit.

As an example of the problem with SVDFIT, consider a linear fit with an uncertainty of 0.01 in the Y coordinate

```
STIS> x = indgen(10)
STIS> y = x + 0.01*randomn(seed,10)
```

First, I try a linear fit with LINFIT and print the derived parameters and
their sigma values

```
IDL> param = LINFIT(x, y, sigma = sig)
```

```
IDL> print,param
   -0.00540641      1.00106
IDL> print, sig
    0.00654651   0.00122627
```

Now try a linear fit (a polynomial with 2 parameters) of the same data
using SVDFIT

```
IDL> param = svdfit(x,y,2,sigma=sig)
IDL> print,param
  -0.00540641      1.00106
IDL> print,sig
   0.587754     0.110096
```

Although SVDFIT gives the right parameter values, the associated sigma
values
are much too large. This is because SVDFIT assumed individual errors
of 1
unit, whereas LINFIT computed

```
yfit = param(1)*x + param(0)
sigma = total( (yfit-y)^2)/8. ))
```

to estimate individual errors of 0.011 units

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