Subject: CURVEFIT.PRO standard deviations?
Posted by Ralf Flicker on Sat, 11 May 2002 04:51:38 GMT
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Folks, I'm at wits' end here, don't know what's going on.

I need to do a chi-square minimization curve fitting of a nonlinear parametrized function to noisy data. Using the routine CURVEFIT.PRO works admirably for the fitting itself, and the chi-square comes out ok, but the values returned for the standard deviations (sigma optional argument) on the fitted coefficients just don't make sense to me.

Looking at the source code (idl 5.3) and comparing with the Levenberg-Marquardt algorithm in Numerical Recipes (ch 15.5), I am still unable to pinpoint the error (whether in my code or in my admittedly lacking understanding of chi-square statistics..).

So here's a code I wrote (FTEST.PRO) for testing CURVEFIT versus a routine I know works, LINFIT. It generates a noisy straight line, fits a line using both LINFIT and CURVEFIT, and plots both fits together with the fits offset by one sigma on the coefficients.

You can see the discrepancy in the one-sigma lines: can someone tell me what's up with the sigma returned from CURVEFIT, and how I can make them conform?

ralf

```
;=============================================
; straight line
pro fline,x,a,f,pder
f = a(0)+x*a(1)
end

;=============================================
; Test of CURVEFIT vs. LINFIT
pro ftest,noise

; sample calling sequence : ftest,0.4

 ; generate noisy line
f0 = (findgen(25)*3.-15)*(1.+randomn(seed,25)*noise)
x = findgen(25)
loadct,4
plot,x,f0,xstyle=2,psym=-1
```

```
 ; straight-line chi-square fitting with LINFIT.PRO
a = linfit(x,f0,chisq=csq,sigma=sig)
fline,x,a,f & oplot,x,f,color=80
fline,x,[a+sig],f & oplot,x,f,linestyle=2,color=80
fline,x,[a-sig],f & oplot,x,f,linestyle=2,color=80
print,'LINFIT parameters, sigma, and chi-square : '
print,a,sig,csq

 ; Levenberg-Marquardt chi-square fitting
 ;of straight line with CURVEFIT.PRO
a = [0.,1.]
weights = fltarr(n_elements(x))+1.
 f=curvefit(x,f0,weights,a,sig,function_name='fline',chisq=cs q,/noderivative)
oplot,x,f,color=200
oplot,x,a(0)+sig(0)+x*(a(1)+sig(1)),linestyle=2,color=200
oplot,x,a(0)-sig(0)+x*(a(1)-sig(1)),linestyle=2,color=200
print,'CURVEFIT parameters, sigma, and chi-square : '
print,a,sig,csq

end
;=============================================

(recombine as necessary)
```