Subject: Getting the errors on the fitted parameters using mpfit2dpeak
Posted by dbarkats on Wed, 13 Aug 2003 01:32:20 GMT
View Forum Message <> Reply to Message

Hi everyone,

I have been trying to understand the returned errors on parameters using Craig's mpfit2dpeak function. Because things just did not make sense, I decided to make some simualtions:

I generated 1000 simualtions of a 2d gaussian Z_i,j where in each realization all the parameters are fixed exept for one (the fwhm_x) which I draw from a gaussian distribution of known mean and sigma. For each realization, I thus feed mpfit2dpeak the Z_i,j points as well as the errors on Z_i,j obtained from simple error propagation. I do this 1000 times and save the return parameters as well as their errors (perror). At the end, I compare the original distibution of the fwhm_x and the recoved distribution of FWHM_X and its error.
With numbers , this is what I get

-Original distribution of FWHM_X, mean=0.08 and sigma=0.01
-Mean and sigma of recovered distribution of FWHM_X, mean=0.079 and sigma=0.0097 which is fine,
BUT!!!!!
- Mean of recovered distribution of error of FWHM_X , mean=0.000103.
In other words, the recoved error on FWHM_X is 100 times smaller than the inputted error. This is exactly why I decided to do some simulation in the 1st place. I was getting much too small recovered parameter errors.

Now I know that getting the right errors on fitted parameters is an art, but if anyone has a clue as to why this gives me such a discrepacy, I would love to hear it.
I have not yet checked to see if there is a dependance on the exact original values I entered. I have not tried to see if this effect happens with a simpler 1d gaussfit.

I include here the code used to run these simualtions.

-Denis

```
;#################################
PRO simulated_gauss, out

amp=7                       ; input amplitude
sigmasx=0.01
sx=randomn(seed,1000)*sigmasx+0.08  ; input FHWM_X
sy=0.1                      ; input FWHM_Y
```

```
x=0.5*findgen(100)/100-.25          ; input x grid
y=0.5*findgen(100)/100-.25          ; input y grid
out=fltarr(2,1000)                ; to save the output fwhm_x and
err
g1=fltarr(100,100)                 ; 2d_gaussian
g1err=fltarr(100,100)                ; error on 2d_gaussian
for k=0,1000 do begin                ; loop over 1000 realizations
 print,k,  sx(k)
 for i=0,99 do begin
  for j=0,99 do begin
   e=exp(-0.5*((x(i)/sx(k))^2+(y(j)/sy)^2))
   g1(i,j)=amp*e
   g1err(i,j)=sigmasx*(x(i)^2/sx(k)^3)*g1(i,j)
  endfor
 endfor

 ;contour, g1, x, y, /fill, nlevels=40
 fit=mpfit2dpeak(g1,a,x,y, error=g1err, perror=aerr)  ; do the 2d_fit
 print,a, aerr
 ;contour, fit, x, y, /overplot, color=white
; ploterror,g1(50,*), g1err(50,*), psym=2
; oplot, fit(50,*), color=200 &pause
; ploterror,g1(*,50), g1err(*,50), psym=2
; oplot, fit(*,50), color=2000 &pause
 out(*,k)=[a(2),aerr(2)]
endfor
END
;#########################################################
```