Subject: Error bars
Posted by MA on Thu, 08 Sep 2005 19:28:06 GMT
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Hello,
I have a (scientific) problem and could use some help on how to best solve it with IDL. I am trying to calculate a confidence interval on a cloud fraction that can range between 0 and 1. I have a mathematical function that calculates the probability of occurrence of all cloud fractions between 0 and 1, given a couple of input parameters, e.g.

```
t=250.    ;; constant, number of samples
s=120.   ;; number of cloudy samples, can range between 0 and t
n=3.       ;; number of 'gaps' between continuously cloudy samples
y=IndGen(1000)/999.    ;; this is arbitrary, could choose more/less
points between 0 and 1
p=FltArr(1000)
p=(s^(n-1.)*(t-s)^n*(1./y-1.)^n*Factorial(2.*n-1.))/ $
     ((s/y+t-2.*s)^(2.*n-1.)*(y-1.)^2.*Factorial(n)*Factorial(n-1 .))
```

This curve can be a nice bell shape (as with the parameters above), but can also be flat (if probability is same everywhere) or be very skewed, to the point where the curve goes to infinity (in IDL world) (you can fiddle around with s and n for that, though n>=1). The first and last entry in the array are often either NaN (s/y=NaN for y=0) or Inf.
To find the 90% error bar on the cloud fraction, I have to find the two cloud fractions between which 90% of the area under the curve lies. Is there a smart way to calculate this error bar? Graphically, I'd draw a horizontal line across the plot, see at what cloud fractions it intercepts the curve, calculate the area under the curve between those cloud fractions. If it's more/less than 90%, I'd lift/lower the horizontal line and repeat. I've tried to mimic this process in my program, but it takes forever and is not very accurate. Also, the infinity/NaN values are really annoying (though pysically correct, since the function only applies for fractions between 0,1, exclusive of those values), because the total area under the curve is no longer 1.
Any suggestions on how to do this better? Maybe something with Histogram?
Thanks