Subject: regression with error bars
Posted by Meagan Adams on Tue, 04 May 2010 19:57:04 GMT
View Forum Message <> Reply to Message

Hello

I have two columns of data y (with errors Err+ and Err- for each data point) and x (with Err). I would like to find the linear regression coefficients A and B (in y=Ax+B) considering the errors in my data point. Is their a function in IDL which would do the trick? and the regression has to do with the errors in y only but not in x, right?

Thank you for your help.

Subject: Re: regression with error bars
Posted by Craig Markwardt on Wed, 05 May 2010 02:19:26 GMT
View Forum Message <> Reply to Message

On May 4, 3:57 pm, Meagan Adams <meagan....@gmail.com> wrote:
> Hello
>
> I have two columns of data y (with errors Err+ and Err- for each data
> point) and x (with Err). I would like to find the linear regression
> coefficients A and B (in y=Ax+B) considering the errors in my data
> point. Is their a function in IDL which would do the trick? and the
> regression has to do with the errors in y only but not in x, right?

I don't believe there is a built-in function in IDL which can do this.

You can use MPFIT. The trick is that you will need to be able to form your own scaled residual. Normally you would have a user function something like this,

```
FUNCTION MYFUNCT, P, X=X, Y=Y, ERROR=ERROR
  MODEL = F(X,P)  ;; User model
  RETURN,  (Y - MODEL)/ERROR
END
```

but now you will need to reformulate as,

```
FUNCTION MYFUNCT, P, X=X, Y=Y, ERROR_PLUS=ERROR_PLUS,
ERROR_MINUS=ERROR_MINUS
  MODEL = F(X,P)  ;; User model
  RESID_PLUS  = (Y - MODEL) / ERROR_PLUS   ;; Residual for positive
values
  RESID_MINUS = (Y - MODEL) / ERROR_MINUS  ;; Residual for negative
values
  ;; Combine the two kinds of residuals
  RESID = (RESID_PLUS GT 0)*RESID_PLUS + (RESID_MINUS LT
```

```
0)*RESID_MINUS
  RETURN, RESID
END
```

Happy fitting,
Craig

Subject: Re: regression with error bars
Posted by Giuseppe Papa on Sat, 22 May 2010 13:34:24 GMT
View Forum Message <> Reply to Message

Hello,

Thank you for your reply and examples. I am a newbie to IDL and I've never used MPFIT. I read the tutorial from this website:
http://cow.physics.wisc.edu/~craigm/idl/mpfittut.html

and I wrote a pro to fit a line to x and y if we had errors in y only (+/-):

```
pro test

xval = [1,2,3,4,5]
yval = [1.2,1.9, 3.1, 4.5, 5]
errval = [0.1,0.001,0.1,0.05,0.2]

expr = 'P[0]+P[1]*X'  ;line y=A+Bx

result = MPFITEXPR(expr, xval, yval,errval)

plot, xval, yval, psym=2
oplot, xval, result[0]+result[1]*xval

l=linfit(xval, yval) ;no errors considered
oplot, xval, l[0]+l[1]*xval, linestyle=1

end
```

Are the error values (errval) used in this way in the function MPFITEXPR? And if not, after I calculate the residuals using your method, how do I feed it into the function MPFITFUN ?

Thank you!!

---
frmsrcurl: http://compgroups.net/comp.lang.idl-pvwave/regression-with-e rror-bars

Subject: Re: regression with error bars
Posted by Craig Markwardt on Sat, 22 May 2010 15:02:16 GMT
View Forum Message <> Reply to Message

On May 22, 9:34 am, Meagan A. <u...@compgroups.net/> wrote:
> Hello,
>
> Thank you for your reply and examples. I am a newbie to IDL and I've never used MPFIT. I read the tutorial from this website:http://cow.physics.wisc.edu/~craigm/idl/mpfittut.htm I
>
> and I wrote a pro to fit a line to x and y if we had errors in y only (+/-):
>
> pro test
>
> xval = [1,2,3,4,5]
> yval = [1.2,1.9, 3.1, 4.5, 5]
> errval = [0.1,0.001,0.1,0.05,0.2]
>
> expr = 'P[0]+P[1]*X' ;line y=A+Bx
>
> result = MPFITEXPR(expr, xval, yval,errval)
>
> plot, xval, yval, psym=2
> oplot, xval, result[0]+result[1]*xval
>
> l=linfit(xval, yval) ;no errors considered
> oplot, xval, l[0]+l[1]*xval, linestyle=1
>
> end
>
> Are the error values (errval) used in this way in the function MPFITEXPR? And if not, after I calculate the residuals using your method, how do I feed it into the function MPFITFUN ?

There are several MPFIT* functions. You can't use MPFITFUN or MPFITEXPR because you are changing the standard definition of "residual" because you have different + and - error bars. Instead you will need to use the core engine MPFIT(), and you will need to write a user function like I described in my previous post.

Craig

Subject: Re: regression with error bars
Posted by Giuseppe Papa on Sat, 22 May 2010 16:29:25 GMT
View Forum Message <> Reply to Message

Perfect!! Thank you!!!!

---
frmsrcurl: http://compgroups.net/comp.lang.idl-pvwave/regression-with-e rror-bars

---

Subject: Re: regression with error bars
Posted by Giuseppe Papa on Sat, 22 May 2010 16:44:54 GMT
View Forum Message <> Reply to Message

One more question, please.

In:
RESID =3D (RESID_PLUS GT 0)*RESID_PLUS + (RESID_MINUS LT
0)*RESID_MINUS

Shouldn't we subtract the two resids instead of adding them? Thank you again!

---
frmsrcurl: http://compgroups.net/comp.lang.idl-pvwave/regression-with-e rror-bars

---

Subject: Re: regression with error bars
Posted by Craig Markwardt on Sat, 22 May 2010 17:53:34 GMT
View Forum Message <> Reply to Message

On May 22, 12:44 pm, Meagan A. <u...@compgroups.net/> wrote:
> One more question, please.
>
> In:
> RESID = (RESID_PLUS GT 0)*RESID_PLUS + (RESID_MINUS LT
> 0)*RESID_MINUS
>
> Shouldn't we subtract the two resids instead of adding them? Thank you again!

Not really. The "addition" there is an IDL vectorized short-hand
notation for, "if residuals are greater than zero use RESID_PLUS;
otherwise use RESID_MINUS". Only one clause of expression is non-
zero, so you are never really adding or subtracting residual values.

Craig
