
Subject: Re: Can IDL calculate the confidence level about correlation

Posted by [wanglin1981](#) on Fri, 23 Nov 2007 01:51:28 GMT

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I found a code which can calculate the confidence level using pvalue method (see below). It works well, but usually I use the Student's t-test method. So can anyone help?

Thanks!

```
r=correlate(x,y)
var=1/(n-3.0)
zvalue = 0.5*alog((1+r)/(1-r))/sqrt(var)
if (zvalue lt 0) then pvalue = 2*(gauss_pdf(zvalue)) $
else pvalue = 2*(1-gauss_pdf(zvalue))
```

Subject: Re: Can IDL calculate the confidence level about correlation

Posted by [yp](#) on Fri, 23 Nov 2007 12:06:09 GMT

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Not exactly what you want... but this might give you some idea.

```
;+
; PRO: sig_test
; Significance Test of correlation for a sample size = N
;
; N:   Number of observations
; r:   Correlation coefficient
; Pr:  Probaility that random noise could produce the result
(correlation) with N samples
;   Pr=ERFC(r*sqrt(N/2))
; ERFC: Complementary Error Function
; rsig: At which we have 100*(1-limit) chance that random data would
produce this result (r)
;   rsig=INVERF(limit)*sqrt(2/N)

; Interpretation:
;   Any "r" value greater than "rsig" are significant at "limit*100"
level
; Modification: Yaswant Pradhan 10/6/05
;-
```

```
PRO sig_test
r=0D
N=0D
Pr=0D
```

```

rsig=0D
i=0.99

input: read,'Input Correlation coefficint and Number of samples [r,
N]',r,N
if (r gt 1.0 or r lt -1.0) then begin
    err=widget_message('r value should be between -1.0 and 1.0. Input
r, N again!','Error)
    goto, input
endif

r=abs(r)
Pr= ERFC(r*sqrt(N/2.))

while (inverf(i)*sqrt(2./N) gt r) do begin
    i=i-0.01
    rsig=inverf(i)*sqrt(2./N)
endwhile

print,'Correlation Significance Test Result:'
print,'=====
print,'Correlation coefficient: ',r
print,'Number of samples: ',N
print,'Confidence Limit: '+string(9b)+string(i*100,format='(i2.2)')
+'%'
print,'Probability (Pr): ',Pr
print,'=====
END

```

On Nov 23, 1:51 am, Lin Wang <wanglin1...@gmail.com> wrote:

```

> I found a code which can calculate the confidence level using pvalue
> method (see below). It works well, but usually I use the Student's t-
> test method. So can anyone help?
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```

Subject: Re: Can IDL calculate the confidence level about correlation
Posted by [Vince Hradil](#) on Fri, 23 Nov 2007 21:02:01 GMT
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On Nov 22, 7:51 pm, Lin Wang <wanglin1...@gmail.com> wrote:

> I found a code which can calculate the confidence level using pvalue
> method (see below). It works well, but usually I use the Student's t-
> test method. So can anyone help?

>

> Thanks!

>

> r=correlate(x,y)

> var=1/(n-3.0)

> zvalue = 0.5*log((1+r)/(1-r))/sqrt(var)

> if (zvalue lt 0) then pvalue = 2*(gauss_pdf(zvalue)) \$

> else pvalue = 2*(1-gauss_pdf(zvalue))

I think THIS is the way to do it. The t-test is irrelevant.

Subject: Re: Can IDL calculate the confidence level about correlation

Posted by [Mike\[2\]](#) on Fri, 23 Nov 2007 23:25:00 GMT

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Be careful of correlation coefficients! Are you familiar with
"Anscombe correlation examples"? Interesting data set - should be
able to google it up, or find it in Amer Stat 27 (1973) 17.

Subject: Re: Can IDL calculate the confidence level about correlation

Posted by [wanglin1981](#) on Sat, 24 Nov 2007 01:28:16 GMT

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> Be careful of correlation coefficients! Are you familiar with
> "Anscombe correlation examples"? Interesting data set - should be
> able to google it up, or find it in Amer Stat 27 (1973) 17.

Mike,

Thanks for your advice. I've found the example you mentioned on the
web via <http://www.tufts.edu/~gdallal/anscombe.htm>. It's really
interesting! I will be very careful with the results. Thanks again.

Lin

Subject: Re: Can IDL calculate the confidence level about correlation

Posted by [wanglin1981](#) on Sat, 24 Nov 2007 01:30:26 GMT

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> On Nov 22, 7:51 pm, Lin Wang <wanglin1...@gmail.com> wrote:
 >
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 >> else pvalue = 2*(1-gauss_pdf(zvalue))
 >
 > I think THIS is the way to do it. The t-test is irrelevant.

Vince,

Yes, p-value test can test the significance of correlations, but t-test is also widely used in meteorological studies, even more popular than p-value test I think.

The probability density function for correlation coefficient r is:

$$f(r) = \frac{\Gamma((n-1)/2)}{\Gamma(n/2)} (1-r^2)^{(n-2)/2} \sqrt{\pi}$$

Set $r=t/\sqrt{n-2}/\sqrt{1+t^2/(n-2)}$, and $v=n-2$, then

$f(r)dr = (\text{after some transformation}) = [1/\sqrt{v\pi}] * [\Gamma((v+1)/2) / \Gamma(v/2)] * [(1+t^2/2)^{-v/2}] * dt$
 this is the probability density function for t distribution, so the significance of r can be evaluated by the t-test.

Lin

Subject: Re: Can IDL calculate the confidence level about correlation
 Posted by [Brian Larsen](#) on Sat, 24 Nov 2007 14:25:04 GMT
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If you want to see this graphically I have some code here:
http://people.bu.edu/balarsen/Home/IDL/Entries/2007/11/5_Regression_with_confidence_bands.html
 to display the regression fit and the confidence bands around the fit. I just noticed there is no reference on the page, I will add one

when I am in the office next week.

Cheers,

Brian

Brian Larsen
Boston University
Center for Space Physics
