How can I calculate the confidence interval for a regression coefficient in Excel?

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June 23, 2024

In order to calculate the confidence interval for a regression coefficient in Excel, you will need to utilize the built-in statistical functions and tools available. This can be done by first obtaining the regression equation and coefficients through the regression analysis tool. Then, using the appropriate function, you can calculate the standard error of the regression coefficient. Finally, by using the confidence level and the standard error, you can determine the upper and lower bounds of the confidence interval for the regression coefficient. This process allows for a reliable estimation of the range in which the true value of the regression coefficient is likely to fall, providing valuable information for statistical analysis and decision-making.

Excel: Calculate Confidence Interval for Regression Coefficient

In a linear regression model, a tells us the average change in the associated with a one unit increase in the predictor variable.

We can use the following formula to calculate a confidence interval for a regression coefficient:

Confidence Interval for $\beta 1$: b1 ± t1-α/2, n-2 * se(b1)

where:

b1 = Regression coefficient shown in the regression tablet1-$\propto$/2, n-2 = The t critical value for confidence level 1-$\propto$ with n-2 degrees of freedom where *n* is the total number of observations in our datasetse(b1) = The standard error of b1 shown in the regression table

The following example shows how to calculate a confidence interval for a regression coefficient in Excel.

Example: Confidence Interval for Regression Coefficient in Excel

Suppose we'd like to fit a simple linear regression model using hours studied as a predictor variable and exam score as a response variable for 15 students in a particular class:

	A	B	C	D	E	F
1	**Hours**	**Score**				
2	1	64				
3	2	66				
4	4	76				
5	5	73				
6	5	74				
7	6	81				
8	6	83				
9	7	82				
10	8	80				
11	10	88				
12	11	84				
13	11	82				
14	12	91				
15	12	93				
16	14	89				
17						
18						
19						

We can type the following formula into cell D2 to perform simple linear regression using the values in the

Hours column as the predictor variable and the values in the Score column as the response variable:

=LINEST(B2:B16, A2:A16, TRUE, TRUE)

Note that the first TRUE argument tells Excel to calculate the intercept of the regression equation normally without forcing it to be zero.

The second TRUE argument tells Excel to produce additional regression statistics besides just the coefficients.

The following screenshot shows the output from this formula (we explain what each value in the output represents in the red text below the output):

	A	B	C	D	E	F
1	Hours	Score				
2	1	64		1.982374768	65.33395176	
3	2	66		0.247963753	2.105989497	
4	4	76		0.830979772	3.640932088	
5	5	73		63.91387108	13	
6	5	74		847.2669759	172.3330241	
7	6	81				
8	6	83		β1	β0	
9	7	82		Std. Error β1	Std. Error β0	
10	8	80		R-squared	Res. Std. Error	
11	10	88		F-Value	Deg Freedom	
12	11	84		SS Regression	SS Residual	
13	11	82				
14	12	91				
15	12	93				
16	14	89				
17						
18						
19						
20						

Using the regression coefficients, we can write the fitted regression equation as:

Score = 65.334 + 1.982*(Hours Studied)

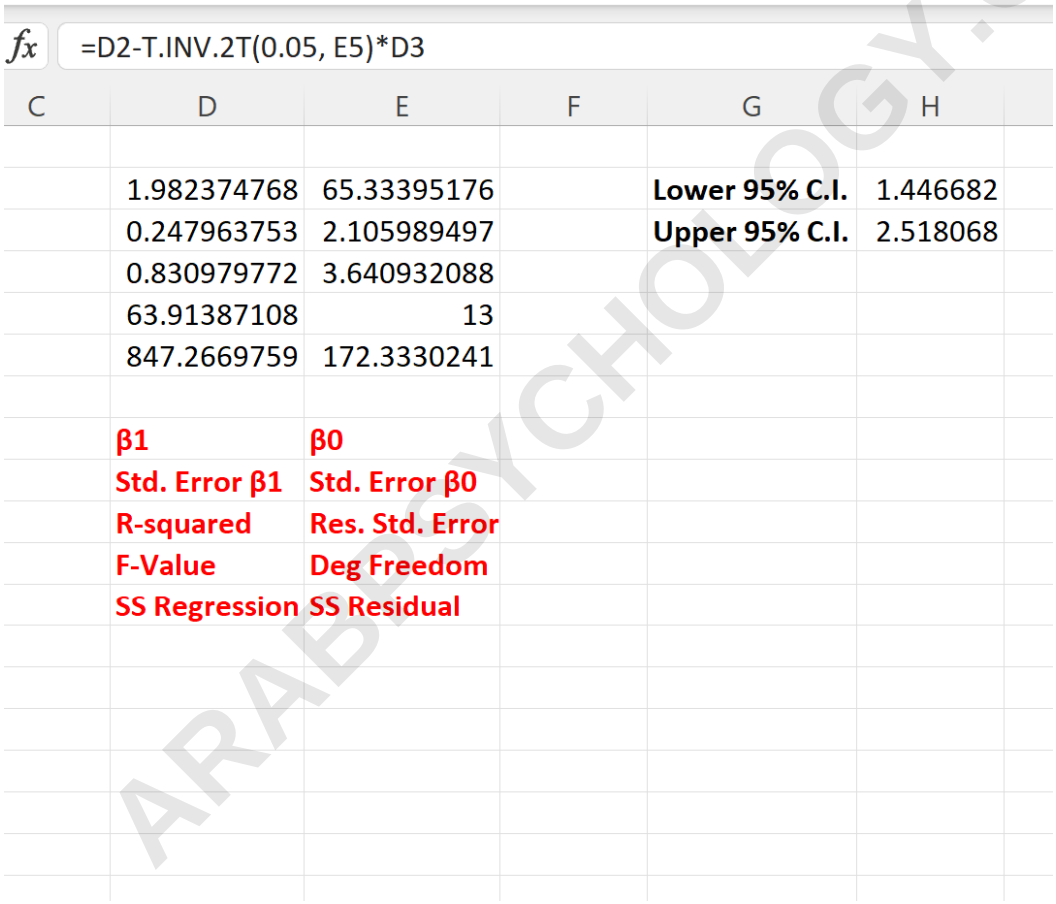
This tells us that each additional one hour increase in studying is associated with an average increase of 1.982 in exam score.

To calculate a 95% confidence interval for the regression coefficient, we can type the following

formulas into cells H2 and H3:

H2: =D2 - T.INV.2T(0.05, E5)*D3H3: =D2 + T.INV.2T(0.05, E5)*D3

The following screenshot shows how to use these formulas in practice:



The 95% confidence interval for the regression coefficient is .

Since this confidence interval , we can conclude that

there is a statistically significant association between hours studied and exam score.

We can also confirm this is correct by calculating the 95% confidence interval for the regression coefficient by hand:

95% C.I. for β1: b1 ± t1-α/2, n-2 * se(b1)95% C.I. for β1: 1.982 ± t.975, 15-2 * .24895% C.I. for β1: 1.982 ± 2.1604 * .24895% C.I. for β1:

The 95% confidence interval for the regression coefficient is .

The following tutorials explain how to perform other common tasks in Excel: