

TESTS OF SIGNIFICANCE OF THE DIFFERENCES BETWEEN REGRESSION COEFFICIENTS DERIVED FROM TWO SETS OF CORRELATED VARIATES

A - Papers appearing in refereed journals

Yates, F. 1939. Tests of significance of the differences between regression coefficients derived from two sets of correlated variates. *Proceedings of the Royal Society of Edinburgh*.59, pp. 184-194.

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Authors

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Abstract

The calculation of the partial regression of different, but correlated, dependent variates on the same set of independent variates is of common occurrence. Frequently, also, the differences between the resultant regression coefficients are of interest, and tests of significance for these differences are consequently required. In the classical wheat experiments on Broadbalk field at Rothamsted, for example, the influence of rainfall on yield has been investigated for the various plots, which receive different manurial treatments (Fisher, 1924). An extension of the method of partial regressions was used, which analytically amounted to the evaluation, for each plot separately, of the regression of yield on quantities representing the amount and distribution of rain in each year, these quantities being the same for all plots, since the plots were situated on the same field. One of the most interesting aspects of these results was the differences which were revealed between the effects of rainfall on the differently manured plots. (See also Cochran, 1935.)

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Having estimated a linear regression with p coefficients, one may wish to test whether m additional observations belong to the same regression. This paper presents systematically the tests involved, relates the prediction interval (for $m = 1$) and the analysis of covariance (for $m > p$) within the framework of general linear hypothesis (for any m), and extends the results to testing the equality between subsets of coefficients. 1. INTRODUCTION. Statistically these questions can be answered by testing whether two sets of observations can be

regarded as belonging to the same regression model. If we form the difference between the vector Y_2 and the vector of predictions based on the regression estimated by the first n observations, we have, incorporating the relations (2) and (3) The correlation coefficient of 0.846 indicates a strong positive correlation between size of pulmonary anatomical dead space and height of child. But in interpreting correlation it is important to remember that correlation is not causation. There may or may not be a causative connection between the two correlated variables. Moreover, if there is a connection it may be indirect. where d is the difference in the ranks of the two variables for a given individual. Thus we can derive table 11.2 from the data in table 11.1 . From this we get that. In this case the value is very close to that of the Pearson correlation coefficient. For $n > 10$, the Spearman rank correlation coefficient can be tested for significance using the t test given earlier. The regression equation. Okay, I have two different data sets, A and B, both of which correspond to a third data set, C. I have run least-squares regression on both A with C and B with C. The correlation coefficient of A with C is 72.9%, compared to 66.5% for B with C. How do I know or how do I test that that 6.5% difference is significant? $\$begingroup\$$ If I type into Google, the first link is: quantitativeskills.com/sisa/statistics/corrhlp.htm Which provides a link to a web page that does the calculation for you. The references at the bottom of the page provide the formulas that are used (and I imagine that some of the other links from that search will give you the formulas too.) $\$endgroup\$$ – Jeremy Miles May 6 '14 at 5:04. add a comment |. Tests of Regression Coefficients. Each regression coefficient is a slope estimate. With more than one independent variable, the slopes refer to the expected change in Y when X changes 1 unit, CONTROLLING FOR THE OTHER X VARIABLES. That is, b_1 is the change in Y given a unit change in X_1 while holding X_2 constant, and b_2 is the change in Y given a unit change in X_2 while holding X_1 constant. So to find significant b weights, we want to minimize the correlation between the predictors, maximize the variance of the predictors, and minimize the errors of prediction. Consider these when you are designing your research. If you don't you could have a problem with power for the significance test, and your hard work may not pay off.