How can I use the CHITEST function in Excel to calculate the significance of differences between two sets of data?

Authored by

stats writer

June 29, 2024

The CHITEST function in Excel is a statistical tool that allows users to determine the significance of differences between two sets of data. It calculates the p-value, which is a measure of the probability that the observed differences between the two sets of data occurred by chance. This function is commonly used in hypothesis testing to determine if there is a significant difference between two groups or variables. By inputting the data into the function, users can easily determine the level of significance and make informed decisions based on the results. The CHITEST function is a valuable tool for anyone looking to analyze and compare data sets in a reliable and efficient manner.

Returns the test for independence. CHITEST returns the value from the chi-squared ($\chi 2$) distribution for the statistic and the appropriate degrees of freedom. You can use $\chi 2$ tests to determine whether hypothesized results are verified by an experiment.

Important: This function has been replaced with one or more new functions that may provide improved accuracy and whose names better reflect their usage. Although this function is still available for backward compatibility, you should consider using the new functions from now on, because this function may not be available in future versions of Excel.

For more information about the new function, see CHISQ.TEST function.

Syntax

CHITEST(actual_range,expected_range)

The CHITEST function syntax has the following arguments:

Actual_range Required. The range of data that contains observations to test against expected values.

Expected_range Required. The range of data that contains the ratio of the product of row totals and column totals to the grand total.

Remarks

If actual_range and expected_range have a different number of data points, CHITEST returns the #N/A error value.

The $\chi 2$ test first calculates a $\chi 2$ statistic using the formula:

$$\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{\left(A_{ij} - E_{ij}\right)^2}{E_{ij}}$$

where:

Aij = actual frequency in the i-th row, j-th column

Eij = expected frequency in the i-th row, j-th column

r = number or rows

c = number of columns

A low value of $\chi 2$ is an indicator of independence. As can be seen from the formula, $\chi 2$ is always positive or 0, and is 0 only if Aij = Eij for every i,j.

CHITEST returns the probability that a value of the $\chi 2$ statistic at least as high as the value calculated by the above formula could have happened by chance under the assumption of independence. In computing this probability, CHITEST uses the $\chi 2$ distribution with an appropriate number of degrees of freedom, df. If r > 1 and c > 1, then df = (r - 1)(c - 1). If r = 1 and c > 1, then df = c - 1 or if r > 1 and c = 1, then df = r - 1. r = c= 1 is not allowed and #N/A is returned.

Use of CHITEST is most appropriate when Eij's are not too small. Some statisticians suggest that each Eij should be greater than or equal to 5.

Example

Copy the example data in the following table, and paste it in cell A1 of a new Excel worksheet. For formulas to show results, select them, press F2, and then press Enter. If you need to, you can adjust the column widths to see all the data.

Men (Actual)	**Women (Actual)**	**Description**
58	35	Agree
11	25	Neutral
10	23	Disagree
Men (Expected)	**Women (Expected)**	**Description**
45.35	47.65	Agree
17.56	18.44	Neutral

Men (Actual)	Women (Actual)	Description
16.09	16.91	Disagree
Formula	**Description**	**Result**
=CHITEST(A2:B4,A6:B8)	The $\chi 2$ statistic for the data above is 16.16957 with 2 degrees of freedom.	0.0003082