

How do you perform Welch's t-test in R?

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Welch's t-test is a statistical method used to compare the means of two independent groups when the assumption of equal variances is not met. In R, the `t.test()` function can be used to perform Welch's t-test. This function takes in two numeric vectors as input, representing the data from the two groups, and returns the t-statistic, degrees of freedom, and p-value. The syntax for using the `t.test()` function in R is as follows: `t.test(x, y, alternative = "two.sided", var.equal = FALSE)`, where `x` and `y` are the two groups being compared. This test is commonly used in various fields, such as psychology, economics, and biology, to determine if there is a significant difference between the means of two groups.

Perform Welch's t-Test in R

is used to compare the means between two independent groups when it is *not* assumed that the two groups have equal variances.

To perform Welch's t-test in R, we can use the `t.test()` function, which uses the following syntax:

```
t.test(x, y, alternative = c("two.sided", "less", "greater"))
```

where:

x: A numeric vector of data values for the first group;

y: A numeric vector of data values for the second group;

alternative: The alternative hypothesis for the test. Default is `two.sided`.

The following example shows how to use this function to perform Welch's t-test in R.

Example: Welch's t-test in R

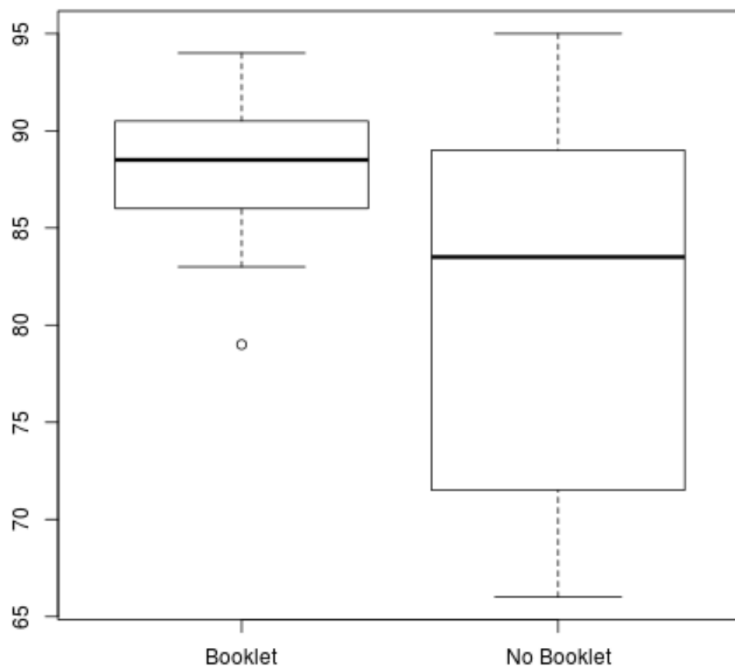
A teacher wants to compare the exam scores of 12 students who used an exam prep booklet to prepare for some exam vs. 12 students who did not.

The following vectors show the exam scores for the students in each group:

```
booklet <- c(90, 85, 88, 89, 94, 91, 79, 83, 87, 88, 91, 90)
no_booklet <- c(67, 90, 71, 95, 88, 83, 72, 66, 75, 86, 93, 84)
```

Before we perform a Welch's t-test, we can first create to visualize the distribution of scores for each group:

```
boxplot(booklet, no_booklet, names=c("Booklet", "No Booklet"))
```



We can clearly see that the "Booklet" group has a higher mean score and lower variance in scores.

To formally test whether or not the mean scores between the groups are significantly different, we can perform Welch's t-test:

```
#perform Welch's t-test  
t.test(booklet, no_booklet)
```

Welch Two Sample t-test

data: booklet and no_booklet

t = 2.2361, df = 14.354, p-value = 0.04171

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

0.3048395 13.8618272

sample estimates:

mean of x mean of y

87.91667 80.83333

From the output we can see that the t test-statistic is 2.2361 and the corresponding p-value is 0.04171.

The `t.test()` function also provides us with the following information:

The 95% for the difference in mean exam scores between the two groups is .The mean exam score of the first group is 87.91667.The mean exam score of the second group is 80.83333.

You can find the complete documentation for the `t.test()` function [here](#).

[How to Perform a Paired Samples t-test in R](#)

[How to Plot Multiple Boxplots in One Chart in R](#)