

What is the complete guide for interpreting t-test results in R?

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The complete guide for interpreting t-test results in R is a comprehensive approach to understanding and analyzing the statistical significance of a t-test in the R programming language. This guide provides step-by-step instructions and explanations for conducting a t-test, interpreting the output, and determining the significance of the results. It also covers the various types of t-tests and their specific applications, as well as how to interpret the p-values and confidence intervals. Additionally, the guide includes examples and practical tips for effectively interpreting t-test results in R. Overall, this guide serves as a valuable resource for researchers, statisticians, and anyone looking to accurately interpret t-test results in R.

Complete Guide: Interpret t-test Results in R

A t-test is used to test whether or not the means of two populations are equal.

This tutorial provides a complete guide on how to interpret the results of a two sample t-test in R.

Step 1: Create the Data

Suppose we want to know if two different species of plants have the same mean height. To test this, we collect a simple random sample of 12 plants from each species.

```
#create vector of plant heights from group 1
```

```
group1 <- c(8, 8, 9, 9, 9, 11, 12, 13, 13, 14, 15, 19)
```

```
#create vector of plant heights from group 2
```

```
group2 <- c(11, 12, 13, 13, 14, 14, 14, 15, 16, 18, 18, 19)
```

Step 2: Perform & Interpret the Two Sample t-test

Next, we will use the `t.test()` command to perform a two sample t-test:

```
#perform two sample t-test  
t.test(group1, group2)
```

Welch Two Sample t-test

data: group1 and group2

t = -2.5505, df = 20.488, p-value = 0.01884

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

95 percent confidence interval:

-5.6012568 -0.5654098

sample estimates:

mean of x mean of y

11.66667 14.75000

Here's how to interpret the results of the test:

data: This tells us the data that was used in the two sample t-test. In this case, we used the vectors called `group1` and `group2`.

t: This is the t test-statistic. In this case, it is -2.5505.

df: This is the degrees of freedom associated with the t test-statistic. In this case, it's 20.488. Refer to the for an explanation of how this degrees of freedom value is calculated.

p-value: This is the p-value that corresponds to a t test-statistic of -2.5505 and $df = 20.488$. The p-value turns out to be .01884. We can confirm this value by using the .

alternative hypothesis: This tells us the alternative hypothesis used for this particular t-test. In this case, the alternative hypothesis is that the true difference in means between the two groups is not equal to zero.

95 percent confidence interval: This tells us the 95% confidence interval for the true difference in means between the two groups. It turns out to be .

sample estimates: This tells us the of each group. In this case, the sample mean of group 1 was 11.667 and the sample mean of group 2 was 14.75.

The two hypotheses for this particular two sample t-test

are as follows:

HA: $\mu_1 \neq \mu_2$ (the two population means are *not* equal)

Because the p-value of our test (.01884) is less than alpha = 0.05, we reject the null hypothesis of the test. This means we have sufficient evidence to say that the mean height of plants between the two populations is different.

Notes

The `t.test()` function in R uses the following syntax:

```
t.test(x, y, alternative = "two.sided", mu = 0, paired = FALSE, var.equal = FALSE, conf.level = 0.95)
```

where:

x, y: The names of the two vectors that contain the data.
alternative: The alternative hypothesis. Options include "two.sided", "less", or "greater."
mu: The value assumed to be the true difference in means.
paired: Whether or not to use a paired t-test.
var.equal: Whether or not the variances are equal between the two groups.
conf.level: The confidence level to use for the

test.

In our example above, we used the following assumptions:

We used a two-sided alternative hypothesis. We tested whether or not the true difference in means was equal to zero. We used a two sample t-test, not a paired t-test. We didn't make the assumption that the between the groups. We used a 95% .

Feel free to change any of these arguments when you conduct your own t-test, depending on the particular test you want to perform.