PAIRED t-TEST:

A CASE STUDY: Employees performance data

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A paired t-test, also known as a dependent t-test or paired samples t-test, is a statistical procedure used to determine if there is a significant difference between the means of two related groups. It is typically used when the observations within each group are paired or matched in some way.

Here's how the paired t-test works:

1.**Data Structure**: In a paired t-test, each subject or item in the sample contributes two measurements or scores, which are paired based on some characteristic (e.g., before and after treatment, measurements from the same subject at different times, etc.).

2.**Null Hypothesis** (H_0): The null hypothesis states that there is no significant difference between the means of the paired measurements. Mathematically, H_0:μ_d=0, where μ_d represents the mean of the differences between paired measurements.

3.**Alternative Hypothesis** (H_1): The alternative hypothesis proposes that there is a significant difference between the means of the paired measurements. Depending on the direction of interest, H_1 could be$\mu_d \neq 0$(two-tailed test), $\mu_d > 0$ (one-tailed test for positive difference), or $\mu_d < 0$ (one-tailed test for negative difference).

4.**Assumption**s:

- The paired differences should be approximately normally distributed.

- The paired differences should be independent of each other.

- The underlying data from which the paired differences are derived should be interval or ratio scale.

5. **Test Statistic**: The test statistic for the paired t-test is calculated as:

$$t = \frac{\bar{d}}{s_d/\sqrt{n}}$$

where:

- $\bar{d}$is the mean of the paired differences.
- s_d is the standard deviation of the paired differences.
- nis the number of pairs.

6.**Degrees of Freedom**: The degrees of freedom df for the paired t-test is n-1, where n is the number of pairs.

7.**Decision**: Compare the calculated t-value to the critical t-value from the t-distribution table or use software to obtain the p-value. If the p-value is less than the significance level (often denoted asα, typically 0.05), then there is sufficient evidence to reject the null hypothesis and conclude that there is a significant difference between the means of the paired measurements.

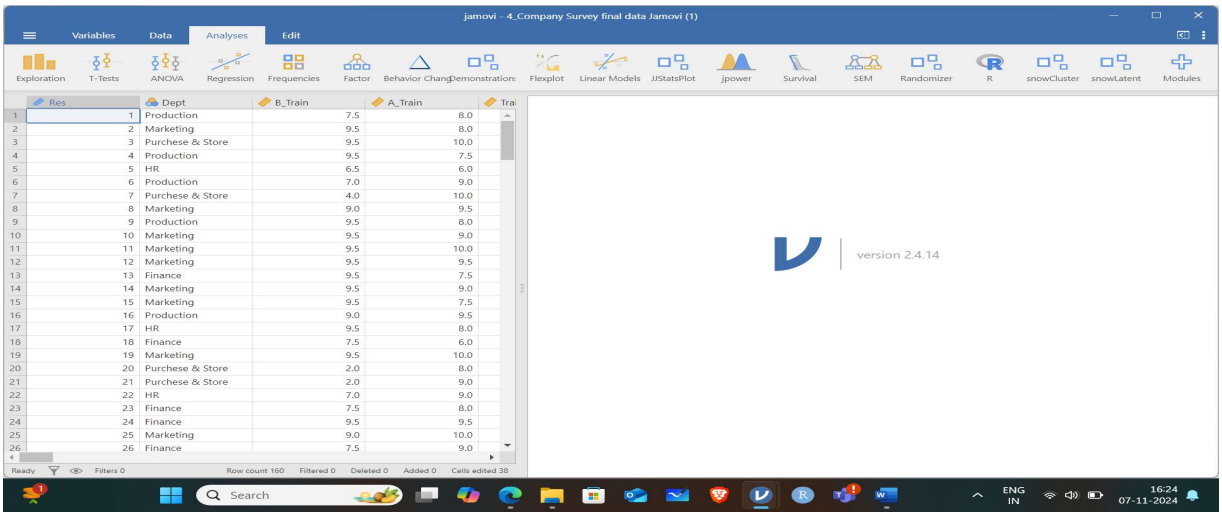
Paired t-tests are commonly used in research and experimental studies where the same subjects are measured before and after an intervention, or under two different conditions. It allows researchers to assess whether the intervention or condition significantly affected the outcome of interest.

The Problem

The purpose of the study is to ascertain employee performance is improving or not.

Data

Download **Survey Data** file form the given link https://dsdhakre.in/Datafiles.html



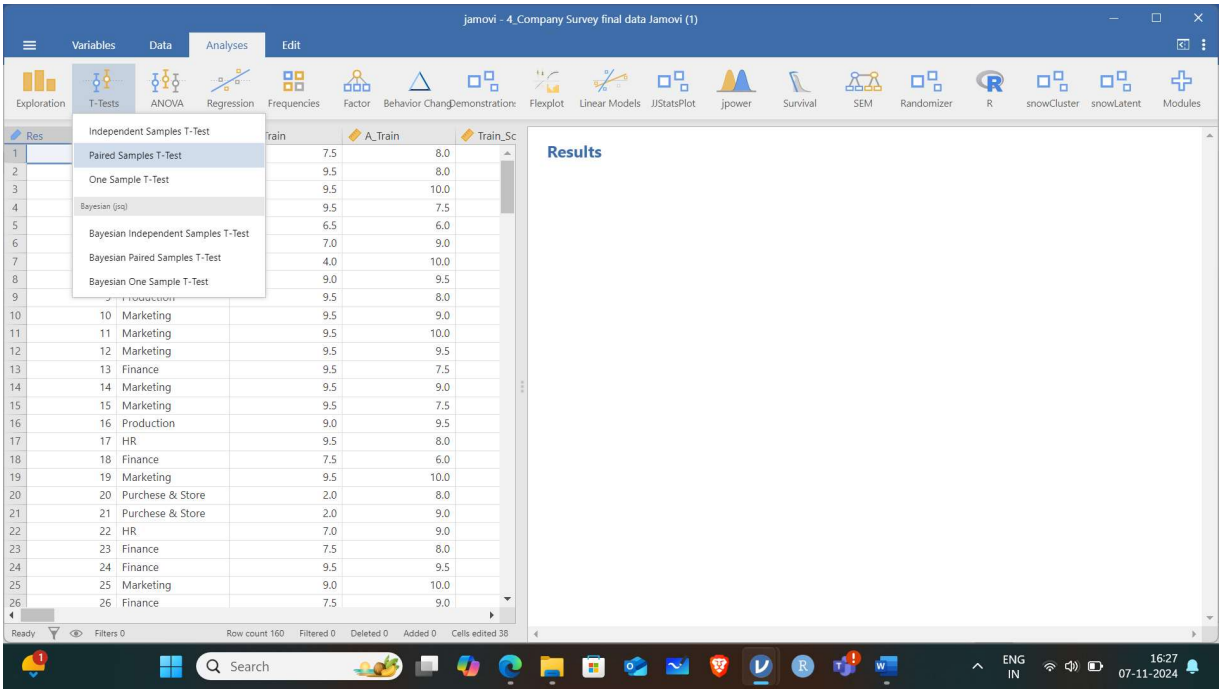
Hypothesis

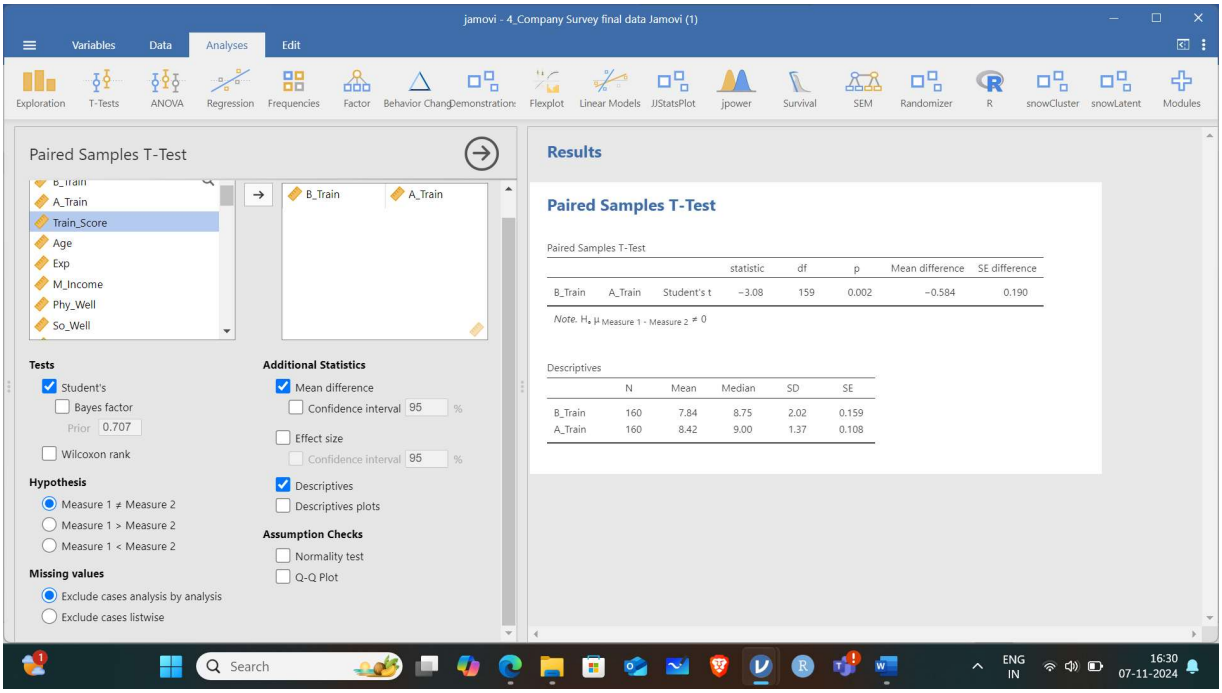
H_0: Performance of employees is same in both test

Independent Variable: **Test**

Dependent variable: **Marks**

Step





Reporting

Group	Mean	Sd	df	SEd	t-value	sig
Before training Marks	7.84	2.02	159	0.190	-3.08	**0.002**
After training Marks	**8.42**	1.37				

So, the p-value found significant at 1% level of significance, Hence Null hypothesis H_0 is rejected. Here, the mean scores show that after training, the scores were increased. It means performance of employee is not same in both the tests. Hence **Employees are improving their knowledge.**

Do your self

Download **paired t test** file form the given link https://dsdhakre.in/Datafiles.html