



Data Science Notes by Sarowar Ahmed



Chapter: inferential statistics



Topic: t-test



What is a t-test?

A t-test is a type of statistical test that helps you compare the means (averages) of two groups to see if they are statistically different from each other. It's particularly useful when dealing with small sample sizes or when you don't know the population's standard deviation.



Types of t-tests:

1. One-sample t-test: Compares the mean of a single group against a known standard.
2. Independent two-sample t-test: Compares the means of two independent groups.
3. Paired t-test: Compares the means from the same group at different times (e.g., before and after a treatment).

✚ Formula:

The basic formula for a t-test is:

$$t = (\bar{x} - \mu) / (s / \sqrt{n})$$

Where:

- \bar{x} is the sample mean.
- μ is the hypothesized mean.
- s is the sample standard deviation.
- n is the sample size.



Example:

- Let's say a teacher wants to know if a new teaching method is more effective. She tests it on a class of 25 students and compares their scores to the traditional method's known average score of 70. The new method's average score is 75 with a standard deviation of 10.

Using the formula:

- $\bar{x}=75$
- $\mu=70$
- $s=10$
- $n=25$

- $t=(75-70)/(10/\sqrt{25})=5/2=2.5$

This t-value is then compared against a critical value from the t-distribution table to determine if the results are statistically significant.



Why is this useful?

- Understanding whether changes in methods, treatments, or any two groups are genuinely effective or different can guide crucial decisions in business, science, and even everyday life.

Got any questions on the t-test? Feel free to ask me via LinkedIn!
Let's keep learning together.

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