

PROBABILITY AND STATISTICS

Hypothesis Testing Z & T

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HYPOTHESIS TESTING Z & T

NULL HYPOTHESIS (H₀):

ALTERNATIVE HYPOTHESIS (H₁ OR H_A):

Z-TEST:

T-TEST:

DEFINITION

A statement that there is no significant difference or effect; any observed difference is due to random chance.

A statement that contradicts the null hypothesis, suggesting a significant difference or effect.

A hypothesis test for population means when the population standard deviation is known.

A hypothesis test for population means when the population standard deviation is unknown.

CHARACTERISTICS

Typically denoted as H₀.

Represents the researcher's claim or interest.

Requires knowledge of population standard deviation (σ).

Uses sample standard deviation (s) to estimate population standard deviation.

EXAMPLE

H₀: There is no difference in the mean scores of two groups.

H₁: The mean scores of two groups are significantly different.

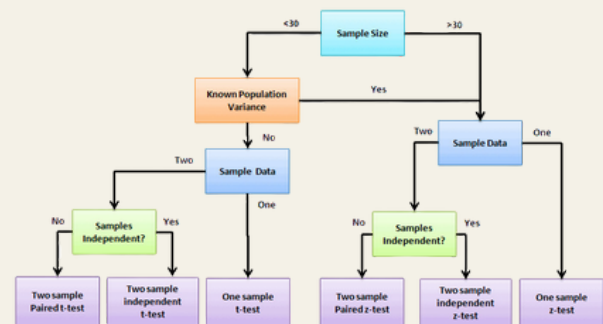
Z-Test for mean IQ scores with a known population standard deviation.

T-Test for mean blood pressure with a sample from a patient group.

DIFERENCES

- Z-Test: Suitable for large sample sizes, requires known population standard deviation.
- T-Test: Appropriate for small sample sizes, uses sample standard deviation to estimate population standard deviation.

PRACTICAL EXAMPLE



A) Let's consider a scenario where you are testing a new drug's effectiveness in reducing blood pressure.

- Null Hypothesis (H₀): The mean blood pressure after taking the new drug is the same as before ($\mu_{\text{before}} = \mu_{\text{after}}$).
- Alternative Hypothesis (H₁): The mean blood pressure after taking the new drug is different from before ($\mu_{\text{before}} \neq \mu_{\text{after}}$).
- If using a Z-Test, you might know the population standard deviation (σ) from previous studies.
- If using a T-Test, you estimate the population standard deviation (σ) from the sample data.

CONCLUSION

Hypothesis testing is a crucial statistical tool for making inferences about populations based on sample data. Understanding the differences between Z and T tests is essential in choosing the appropriate method for analysis. The choice depends on the size of the sample and whether the population standard deviation is known. Real-world applications, such as medical studies, often involve hypothesis testing to assess the effectiveness of treatments or interventions. Learning about hypothesis testing equips researchers and analysts with the tools to draw meaningful conclusions from data, contributing to evidence-based decision-making.