

Hypothesis testing

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9:13 PM

Statistical Hypothesis:- A statistical hypothesis

is an assertion or conjecture concerning one or more populations.

Null Hypothesis & alternative Hypothesis :-

We will have two hypotheses

Null Hypothesis - H_0 : (This is generally the status quo)

Alternative Hypothesis - H_1

For example:- In a binomial distribution, suppose the historical probability of success is $p = 0.10$. Suppose the conjecture is that p is more than 0.10. Then

Null Hypothesis H_0 : $p = 0.10$

Alternative Hypothesis H_1 : $p > 0.10$

$$\frac{\lim_{x \rightarrow 0} 30}{8} = \frac{\lim_{x \rightarrow 0} 6}{25}$$

(25/16)

Example:- A teacher in a school believes that at least 80% of the students will complete high school. A student disagrees with the value and decides to conduct a test.

Null Hypothesis H_0 : $p \geq 0.80$

Alternative Hypothesis H_1 : $p < 0.80$

• We have to either reject H_0 or fail to reject H_0 depending on the data we have.

• Type of errors

	H_0 is true	H_0 is false
Do not reject H_0	Correct decision	Type II error
Reject H_0	Type I error	Correct decision

Definition:- The probability of committing a Type-I error is called level of significance & is denoted by α .

Definition:- The probability of committing a type II error is denoted by β .

- For a fixed sample size, a decrease in the probability of one error will usually result in an increase in the probability of the other error.
- The probability of committing both types of errors can be reduced by increasing the sample size.

Power of a test:- The power of test is the probability of rejecting H_0 given that a specific alternative is true.

$$\text{Power of a test} = 1 - \beta$$

- different types of test can be compared by comparing their powers.

One tailed and two tailed tests

$H_0: \theta = \theta_0$
 $H_1: \theta \neq \theta_0$ } This kind of testing will lead us to two tail test.

$H_0: \theta = \theta_0$ or $H_0: \theta < \theta_0$
 $H_1: \theta > \theta_0$ } This kind of testing will lead us to one tailed test.