



Hypothesis Testing in Real Life

4 Examples of Hypothesis Testing in Real Life

Biology

Hypothesis tests are often used in biology to determine whether some new treatment, fertilizer, pesticide, chemical, etc. causes increased growth, stamina, immunity, etc. in plants or animals.

For example, suppose a biologist believes that a certain fertilizer will cause plants to grow more during a one-month period than they normally do, which is currently 20 inches. To test this, she applies the fertilizer to each of the plants in her laboratory for one month.

She then performs a hypothesis test using the following hypotheses:

$H_0: \mu = 20$ inches (the fertilizer will have no effect on the mean plant growth)

$H_A: \mu > 20$ inches (the fertilizer will cause mean plant growth to increase)

If the p-value of the test is less than some significance level ($\alpha = 0.05$), then she can reject the null hypothesis and conclude that the fertilizer leads to increased plant growth.

Clinical Trials

Hypothesis tests are often used in clinical trials to determine whether some new treatment, drug, procedure, etc. causes improved outcomes in patients.

For example, suppose a doctor believes that a new drug can reduce blood pressure in obese patients. To test this, he may measure the blood pressure of 40 patients before and after using the new drug for one month.

He then performs a hypothesis test using the following hypotheses:

$H_0: \mu_{\text{after}} = \mu_{\text{before}}$ (the mean blood pressure is the same before and after using the drug)

$H_A: \mu_{\text{after}} < \mu_{\text{before}}$ (the mean blood pressure is less after using the drug)

If the p-value of the test is less than some significance level ($\alpha = 0.05$), then he can reject the null hypothesis and conclude that the new drug leads to reduced blood pressure.

Advertising Spend

Hypothesis tests are often used in business to determine whether or not some new advertising campaign, marketing technique, etc. causes increased sales.

For example, suppose a company believes that spending more money on digital advertising leads to increased sales. To test this, the company may increase money spent on digital advertising during a two-month period and collect data to see if overall sales have increased.

They may perform a hypothesis test using the following hypotheses:

$H_0: \mu_{\text{after}} = \mu_{\text{before}}$ (the mean sales is the same before and after spending more on advertising)

$H_A: \mu_{\text{after}} > \mu_{\text{before}}$ (the mean sales increased after spending more on advertising)

If the p-value of the test is less than some significance level ($\alpha = 0.05$), then the company can reject the null hypothesis and conclude that increased digital advertising leads to increased sales.

Manufacturing

Hypothesis tests are also used often in manufacturing plants to determine if some new process, technique, method, etc. causes a change in the number of defective products produced.

For example, suppose a certain manufacturing plant wants to test whether or not some new method changes the number of defective widgets produced per month, which is currently 250. To test this, they may measure the mean number of defective widgets produced before and after using the new method for one month.

They can then perform a hypothesis test using the following hypotheses:

$H_0: \mu_{\text{after}} = \mu_{\text{before}}$ (the mean number of defective widgets is the same before and after using the new method)

$H_A: \mu_{\text{after}} \neq \mu_{\text{before}}$ (the mean number of defective widgets produced is different before and after using the new method)

If the p-value of the test is less than some significance level (e.g. $\alpha = .05$), then the plant can reject the null hypothesis and conclude that the new method leads to a change in the number of defective widgets produced per month.