

Hypothesis Testing: A Visual Introduction to Statistical Significance

Hypothesis testing is a statistical method used to determine whether there is a significant difference between two sets of data. It is used in a wide variety of fields, including science, medicine, and business. In this article, we will provide a visual to hypothesis testing and explain the basic concepts involved.



Hypothesis Testing: A Visual Introduction To Statistical Significance by Scott Hartshorn

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Null Hypothesis and Alternative Hypothesis

The first step in hypothesis testing is to formulate a null hypothesis and an alternative hypothesis. The null hypothesis (H_0) is the hypothesis that there is no difference between the two sets of data. The alternative hypothesis (H_a) is the hypothesis that there is a difference between the two sets of data.

For example, let's say we want to test the hypothesis that the average height of men is greater than the average height of women. The null hypothesis would be that the average height of men is not greater than the average height of women, and the alternative hypothesis would be that the average height of men is greater than the average height of women.

Significance Level

The next step in hypothesis testing is to set a significance level. The significance level is the probability of rejecting the null hypothesis when it is actually true. The significance level is typically set at 0.05, which means that there is a 5% chance of rejecting the null hypothesis when it is actually true.

P-Value

The p-value is the probability of observing a test statistic as extreme as, or more extreme than, the observed test statistic, assuming the null hypothesis is true. The p-value is used to determine whether the null hypothesis should be rejected.

If the p-value is less than the significance level, then the null hypothesis is rejected. This means that there is a statistically significant difference between the two sets of data.

If the p-value is greater than or equal to the significance level, then the null hypothesis is not rejected. This means that there is not a statistically significant difference between the two sets of data.

Type I Error and Type II Error

There are two types of errors that can be made in hypothesis testing: Type I error and Type II error.

A Type I error occurs when the null hypothesis is rejected when it is actually true. This is also known as a false positive.

A Type II error occurs when the null hypothesis is not rejected when it is actually false. This is also known as a false negative.

Hypothesis testing is a powerful statistical tool that can be used to determine whether there is a statistically significant difference between two sets of data. By following the steps outlined in this article, you can learn how to use hypothesis testing to make informed decisions.



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