

Testing a New Teaching Method

Step-by-step hypothesis testing.

Scenario Example: Testing a New Teaching Method

A school has two 10th-grade classes with similar academic performance backgrounds. One class (Class A) was taught math using a new teaching method, and the other class (Class B) was taught using the traditional method. At the end of the semester, both classes took the same final math exam. The school wants to determine if there is a significant difference in the average exam scores between the two classes, indicating the effectiveness of the new teaching method.



Formulate Hypothesis

01

Null Hypothesis (H_0): There is no difference in the mean exam scores between Class A and Class B.

02

Alternative Hypothesis (H_1): There is a difference in the mean exam scores between Class A and Class B.

Choose a Significance Level (α)

Let's choose $\alpha = 0.05$, indicating a 5% risk of concluding there is a difference when there is none.



Select the Appropriate Test Statistic

We use the independent sample t-test because we have two independent groups being compared. For this, we have to check the normality of the numeric variable exam score. We will perform a Shapiro-wilk test. If the p-value becomes higher than 0.05, we will assume the distribution normal.



Calculate the Test Statistic and P-value

- We calculate the t statistic using Python for an independent sample t-test.
- Then, we find the p value associated with the calculated t-statistic, which tells us the probability of observing such a difference (or more extreme) if the null hypothesis were true.



Make a Decision

01

If the p-value is greater than α , we fail to reject the null hypothesis, indicating we don't have sufficient evidence to say there is a difference.

02

If the p-value is less than or equal to α (0.05), we reject the null hypothesis, concluding there is a statistically significant difference in the average scores.



Conclusion

Based on our p-value, we conclude whether there is evidence to support that the new teaching method leads to different average exam scores compared to the traditional method. We can conclude the new teaching method is better if the following conditions are met from the statistical result:

1. At first, there will be significant difference in the average exam scores between class A and class B.
2. Then, the average exam score of the students in Class A must be higher than that of class B.

Thank you for your time 😊

