Welcome

Types of Statistical Errors & Procedure of Test of Hypothesis

Name : Al Kavy Joy

Roll : 220627

Introduction to Hypothesis Testing

Hypothesis testing is a statistical method used to make decisions using experimental data.
- **Null Hypothesis (H_0):** Assumes no effect or difference.
- **Alternative Hypothesis (H_1):** Assumes there is an effect or difference.
- **Goal:** Decide whether to reject H_0 based on sample evidence.

Procedure of Hypothesis Testing (Step 1-2)

Step 1: Define Hypotheses
- H_0 and H_1 must be clearly stated based on the problem.

Step 2: Choose Significance Level (α)
- Common choices: 0.05, 0.01
- Represents the probability of rejecting H_0 when it is actually true.

Procedure of Hypothesis Testing (Step 3-5)
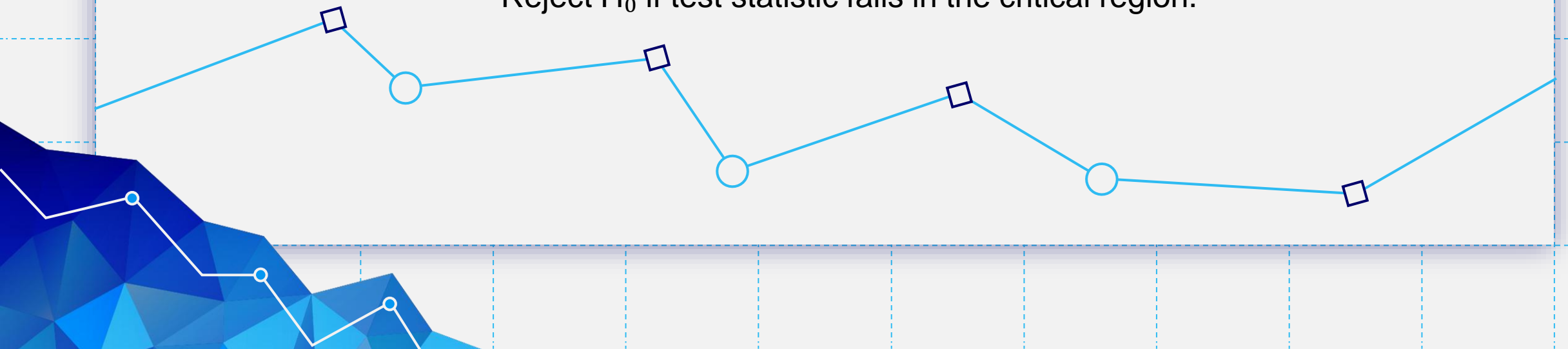
Step 3: Select the Appropriate Test

•Based on data type and sample size (z-test, t-test, chi-square, etc.)

Step 4: Compute the Test Statistic

•Use the chosen test formula.

Step 5: Make a Decision

•Compare the test statistic with the critical value or p-value.

•Reject H_0 if test statistic falls in the critical region.

Types of Statistical Errors

Type I Error (False Positive):
Rejecting H_0 when it's actually true.
Probability = α (Significance level)

Type II Error (False Negative):
Failing to reject H_0 when it's actually false.
Probability = β

Understanding Type I and Type II Errors :

Decision \ Reality	H_0 is True	H_0 is False
Reject H_0	Type I Error	Correct Decision
Fail to Reject H_0	Correct Decision	Type II Error

Trade-off: Decreasing α increases β and vice versa.

Controlling Errors in Hypothesis Testing

- **Set α carefully:** Based on consequences of Type I Error.
- **Increase sample size:** Reduces both errors.
- **Power of a test (1 - β):** Probability of correctly rejecting a false H_0.

Conclusion

- Hypothesis testing is a structured process to make data-driven decisions.
- Errors are part of the process, but they can be minimized.
- Understanding the balance between Type I and II errors is key in statistical analysis.

Thanks