→ Confusion matrix in hypothesis testing

Predicted values \ Actual values	H_0	H_a
Fail to reject H_0	Confidence $(1-\alpha)$ ●	Type II error (β) ●
Reject H_0	Type I error (α) ●	Power of Test $(1-\beta)$ ●

● wrong descission

● correct descission

$$\text{Accuracy} = \frac{\text{Correct predictions}}{\text{Total predictions}}$$

- Confidence $(1-\alpha = CI)$ is probability of accepting True Null Hypothesis.
- Power of Test $(1-\beta)$ is probability of rejecting False Null Hypothesis.
- Type I error (α) occurs when we reject true Null Hypothesis.
- Type II error occurs when we accept False Null Hypothesis.

Confidence ∝ Power of Test

→ Point Estimate (PE)

- The value of any statistics that estimates the value of a parameter
- It is basically test statistic (±).

$$PE \pm \text{Margin Error} = \text{Parameter}$$

$$C_{lower} = PE - \text{Margin Error}$$

$$C_{upper} = PE + \text{Margin Error}$$

$$\text{Margin Error} = Z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$$

(Standard error)

$\frac{\sigma}{\sqrt{n}}$ is population standard deviation

- ex- Sample mean $(\bar{x})$ can be used to estimate population mean (μ).

$\bar{x}$ → μ (estimate)

statistic ← $\bar{x}$; μ → parameter

- Based on distribution Hypothesis testing can be performed at various ends of distribution to find H_0 acceptance or rejection.

→ One Tail
  → Right Tailed
  → Left Tailed
→ Two tailed

→ Test statistics

Hypothesis Test	Test statistics
Z-Test	Z-score
T-Test	T-score
F-Test	F-statistic
Chi-Square Test	Chi-square statistic

- Z, T test are done on normally distributed data.
- Chi-square test done on chi-squared distributed data.
- F-Test done on f distributed data.
- Annova test is variation of F-test.