

A / B Testing

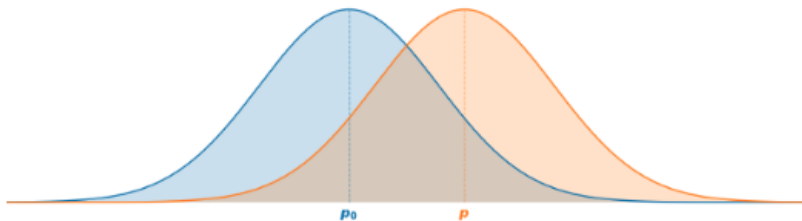
Python Working Group WSU

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A / B Testing

- We want to test if there is a statistically significant difference between two different means in two different distributions.



*Renato Fillinich provides a good resource with code [HERE](#).
The motivating image is referenced from this website.*

Things we are concerned about

- Hypothesis Test:

$$H_0: \mu_{Control} = \mu_{Treatment}$$

$$H_A: \mu_{Control} \neq \mu_{Treatment}$$

with an $\alpha = .05$

- Diagnostics Tests:

1) Normality 2) Equal Variance 3) Auto-correlation

- Power ($1 - \beta$):

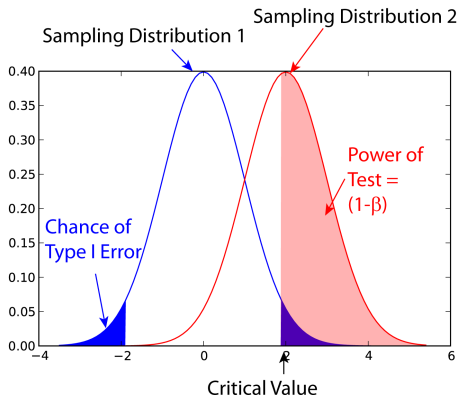
This represents the probability of finding a statistical difference between the groups when a difference is actually present. This is usually set at 0.8 by convention.

A Little More on Power

Table of error types		Null hypothesis (H_0) is	
		True	False
Decision about null hypothesis (H_0)	Don't reject	Correct inference (true negative) (probability = $1-\alpha$)	Type II error (false negative) (probability = β)
	Reject	Type I error (false positive) (probability = α)	Correct inference (true positive) (probability = $1-\beta$)

Type I and type II errors - Wiki

A Little More on Power (cont.)



Power of a test - Wiki

References

- A/B testing: A step-by-step guide in Python
- Statistical Power Analysis in Python
- Calculating Power and the Probability of a Type II Error (A Two-Tailed Example)
- Calculating Power and the Probability of a Type II Error (A One-Tailed Example)