

Introduction to Hypothesis Testing

Performing Hypothesis Generation

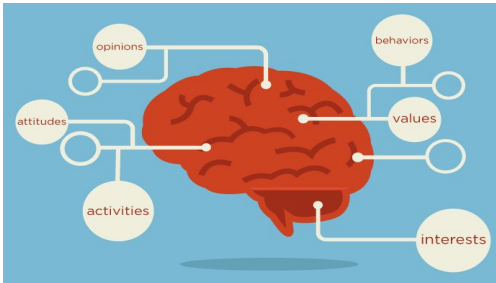


Demographics

- Are females less likely to churn than males?
- Are young customers more likely to churn?
- Are customers located in Tier-1 cities more likely to churn?
- Are married people less likely to churn?

Behavior

- Are vintage customers less likely to churn?
- Are customers with higher average balance less likely to churn?
- Are customers dropping monthly balance high likely to churn?
- Customers with dependent are less likely to attrite?



Psychographic

- Do customers that are inherently more loyal less likely to churn?
- Do customers that have interest in sports more likely to churn?
- Do customers who go to movies often high likely to churn?

Hypothesis Testing



Hypothesis Testing

Consider a person on trial for criminal offence.



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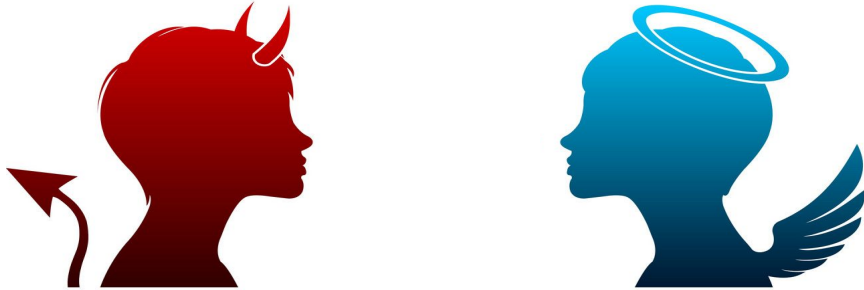
The Judge must decide if he is guilty or innocent.







Hypothesis Testing

Consider a person on trial for criminal offence.





The Judge must decide if he is guilty or innocent.



Hypothesis Testing





The Person is			
		Innocent	Guilty
The Judge Says	Innocent		
	Guilty		

Hypothesis Testing




The Person is			
		Innocent	Guilty
The Judge Says	Innocent		
	Guilty	 Innocent	 Guilty

No Error





Hypothesis Testing

The Person is			
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The Judge Says	Innocent		
	Guilty	 Innocent	 Guilty
		No Error	Error




Hypothesis Testing

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The Judge Says	Innocent	 No Error	 Error
	Guilty	 Error	

Hypothesis Testing

The Person is			
		Innocent	Guilty
The Judge Says	Innocent	 No Error	 Error
	Guilty	 Error	 No Error

Types of Errors

The Person is			
		Innocent	Guilty
The Judge Says	Innocent	 No Error	 Type 2 error
	Guilty	 Type 1 error	No Error

Hypothesis Testing

Consider a person on trial for criminal offence.

The Judge must decide if he is guilty or innocent.

Innocent till Proven Guilty



Hypothesis Testing

Consider a person on trial for criminal offence.

The Judge must decide if he is guilty or innocent.

In order to declare the person guilty, the jury needs that the evidence convinces them “beyond a reasonable doubt”.



Type I Error

$\alpha = P(\text{Type 1 error})$
 $= P(\text{Jury Decides guilty} \mid \text{Person is innocent})$

α small



Type I Error

$\alpha = P(\text{Type 1 error})$
 $= P(\text{Jury Decides guilty} \mid \text{Person is innocent})$

Lesser $\alpha \rightarrow$ needs more evidence to convict



Type II Error

α = P(Type 1 error)
= P(Jury Decides guilty | Person is innocent)

Lesser α --> needs more evidence to convict

β = P(Type 2 error)
= P(Jury Decides Innocent | Person is Guilty)



Hypothesis Testing

The Person is

Innocent



Guilty



Innocent

No error

Type 2 error



Guilty

Type 1 error

No error

Hypothesis Testing

Null Hypothesis (H_0) :

Hypothesis Testing

Null Hypothesis (H_0) :

- Default position

Hypothesis Testing

Null Hypothesis (H_0) :

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- Claim of “no difference”

Hypothesis Testing

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Hypothesis Testing

Null Hypothesis (H_0) :

- Default position
- Claim of “no difference”
- Considered true until evidence suggests otherwise
- H_0 : The person is innocent



Hypothesis Testing

Alternative Hypothesis (H_1) :

Hypothesis Testing

Alternative Hypothesis (H_1) :

- A new finding

Hypothesis Testing

Alternative Hypothesis (H_1) :

- A new finding
- Claim of “difference” or “association”

Hypothesis Testing

Alternative Hypothesis (H_1) :

- A new finding
- Claim of “difference” or “association”
- “Null Hypothesis is rejected”

Hypothesis Testing

Alternative Hypothesis (H_1) :

- A new finding
- Claim of “difference” or “association”
- “Null Hypothesis is rejected”
- H_1 : The person is guilty



Hypothesis Testing

In inferential statistics

Truth about Population		Decision based on sample	
	Null Hypothesis (H_0)	Null Hypothesis (H_0)	Alternative Hypothesis
	Alternative Hypothesis (H_1)	Type 1 error (α)	No error ($1 - \beta$)
		Type 2 error (β)	No error ($1 - \alpha$)

Hypothesis Testing

In inferential statistics

Truth about Population		Decision based on sample	
	Null Hypothesis (H_0)	Null Hypothesis (H_0)	Alternative Hypothesis
	Alternative Hypothesis (H_1)	Type 1 error (α)	No error ($1 - \beta$)
		Type 2 error (β)	No error ($1 - \beta$)

Significance Level

$\alpha = P(\text{Type 1 error})$
= P(Jury Decides guilty | Person is innocent)

Significance Level

$\alpha = P(\text{Type 1 error})$
 $= P(\text{Jury Decides guilty} \mid \text{Person is innocent})$

Lesser $\alpha \rightarrow$ needs more evidence to convict

Steps for Hypothesis Testing



STEP 1: State the hypothesis
(Population)

Steps for Hypothesis Testing



α

STEP 2: Set the level of Significance
(Criterion)

STEP 1: State the hypothesis
(Population)

Steps for Hypothesis Testing



α

STEP 2: Set the level of Significance
(Criterion)



STEP 1: State the hypothesis
(Population)

STEP 3: Compute test Statistics
(Sample)

Steps for Hypothesis Testing



STEP 1: State the hypothesis
(Population)



α

STEP 2: Set the level of Significance
(Criterion)



p

STEP 3: Compute test Statistics
(Sample)

STEP 4: Make a decision based on p value

Steps for Hypothesis Testing



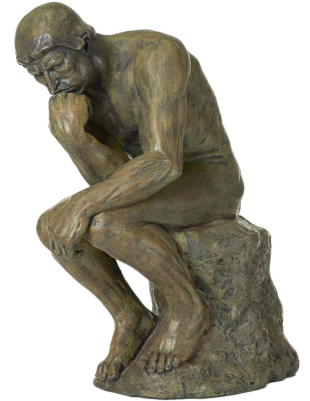
α

STEP 2: Set the level of Significance (Criterion)



p

STEP 4: Make a decision based on p value



STEP 1: State the hypothesis (Population)

STEP 3: Compute test Statistics (Sample)

Thank You!