AUA CS 108, Statistics, Fall 2019

Lecture 36

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Last Lecture ReCap

- Give the Hypo Testing Framework.

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- Give the usual types of Hypotheses

Moral, and Choosing Null Hypotheses

Moral: In Hypothesis tesing, if we have enough evidence from Data against $\mathcal{H}_0$, we Reject it, otherwise, we say that we do not have enough evidence to Reject $\mathcal{H}_0$, so we Fail to Reject it, and keep believing in it.

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One is using this general idea to choose the Null and Alternative Hypotheses: **we will keep believing in Null, if the Data will not show strong evidence against**.

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This is an example of **A/B Testing**.

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Type I and II errors (aka Confusion Matrix)

Assume we are Testing the Hypothesis

$$\mathcal{H}_0 \qquad vs \qquad \mathcal{H}_1.$$

Then the following cases can happen:

Test Decision \ Reality	

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Assume we are Testing the Hypothesis

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Then the following cases can happen:

Test Decision \ Reality	$\mathcal{H}_0$ is True
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Do Not Reject $\mathcal{H}_0$	

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$$\mathcal{H}_0 \qquad vs \qquad \mathcal{H}_1.$$

Then the following cases can happen:

Test Decision \ Reality	$\mathcal{H}_0$ is True	$\mathcal{H}_0$ is False (i.e., $\mathcal{H}_1$ is True)
Reject $\mathcal{H}_0$		
Do Not Reject $\mathcal{H}_0$		

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Test Decision \ Reality	$\mathcal{H}_0$ is True	$\mathcal{H}_0$ is False (i.e., $\mathcal{H}_1$ is True)
Reject $\mathcal{H}_0$		Correct Decision (True Negative)
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Reject $\mathcal{H}_0$		Correct Decision (True Negative)
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Reject $\mathcal{H}_0$	**Type I Error (False Positive)**	Correct Decision (True Negative)
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Reject $\mathcal{H}_0$	**Type I Error (False Positive)**	Correct Decision (True Negative)
Do Not Reject $\mathcal{H}_0$	Correct Decision (True Positive)	**Type II Error (False Negative)**

Can you guess the Null Hypo?

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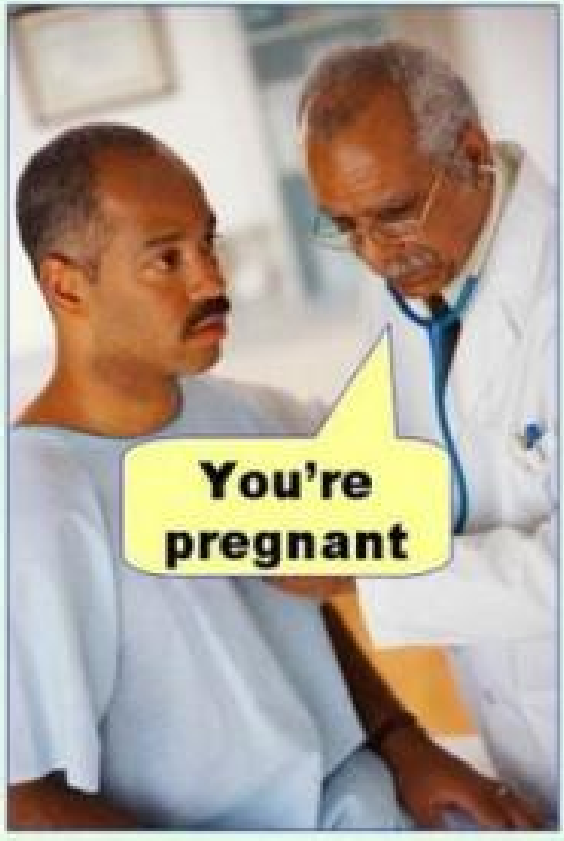
Type I error
(false positive)



Type II error
(false negative)